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INDEX TO CONTENTS, PAGE 368.

ADVERTISERS' INDEX, PAGE 24.

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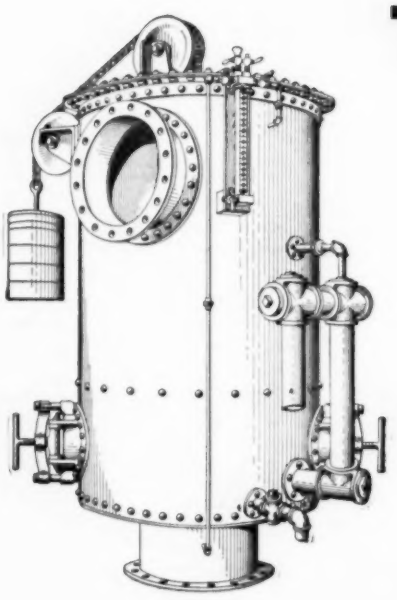

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THE COMPOSITION OF GAS IN RELATION TO THE PERFORMANCE OF THE BUNSEN BURNER.

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R. S. McBride.*

In the American Gas Light Journal for July 5, Mr. Robert ffrench Pierce has presented an article on the above subject, and the editor of the Journal has requested me to offer some comments on the same subject. I am very glad to do this, because of the importance of the matter in considering standards for gas service.

The Bureau of Standards has not made enough tests of gas mantle candle power to be able to offer any experimental work on this subject. However, there are a number of points in Mr. Pierce's article on which there is opportunity for considerable difference of opinion; and it appears to me that the interpretation of certain data presented by Mr. Pierce should be materially modified.

At the outset of his article, Mr. Pierce states that it is "practically impossible to obtain useful comparative data, except from lamps tested side by side upon the same day and at substantially the same hour." It is desirable to bear this point in mind in considering the data presented, for if the generalization be true, too great emphasis should not be laid upon slight variations in test results obtained over a considerable period. It is very desirable because of this uncertainty in the significance of tests, that when experiments are made full record be kept of all conditions of the test, so that subsequent comparison may be possible if there is developed a satisfactory basis for weighting the influence of the several factors.

Flame Temperature.—Mr. Pierce emphasized the importance of flame temperature as follows: "The efficiency of the most important processes involving the uses of gaseous fuel is a function of flame temperature." It is not clear what Mr. Pierce means by flame temperature, as he does not define the term. If he means the maximum temperature at any point within the flame, it might be true to assume that for mantle lighting, gas engines, and some high temperature blow-pipe and torch work that this maximum temperature would be an important factor. On the other hand, if he means the maximum average temperature that could be attained by burning the gas, computed from the total heating value of the gas and the total heat capacity of the products of combustion of the gas with the minimum amount of air with which combustion would be complete, then the uses just mentioned, and some few others, might find this average flame temperature a matter of importance. In furnaces for the heat treatment of metals, metal melting furnaces, etc., to which he makes reference, it is doubtful whether the maximum flame temperature is of any consequence; the maximum average flame temperature would be. On the other hand, with appliances that require only a low temperature, for example, ovens, water heaters, etc., neither the maximum flame temperature nor the maximum average flame temperature would be a large factor, since, in any event, either of these flame temperatures is so far above the temperature at which the operation will be performed that the difference in the flame temperature of different gases would not be an appreciable factor. The heating value of the gas would probably be a direct measure of the usefulness of the gas for these low temperature operations.

"In furnaces for the heat treatment of metals, metal melting furnaces, etc., it is doubtful whether the maximum flame temperature is of any consequence; the maximum average flame temperature would be. On the other hand, with appliances that require only a low temperature, for example, ovens, water heaters, etc., neither the maximum flame temperature nor the maximum average flame temperature would be a large factor, since in any event either of these flame temperatures is so far above the temperature at which the operation will be performed that the difference in the flame temperature of different gases would not be an appreciable factor. The heating value of the gas would probably be a direct measure of the usefulness of the gas for these low temperature operations."

Relation of Open-Flame Candle Power and Heating Value.—Mr. Pierce states: "One frequently hears the opinion expressed that, in the ordinary course of manufacture of carburetted water gas the candle power tends to vary, in a way, with the calorific value." The implication of his discussion is that Mr. Pierce does not believe that there is any such relation, and feels that it is generally admitted that there is no such relation. As a matter of fact, it is known and generally understood that there is no exact mathematical or definite relation between open-flame candle power and heating value of the gas; but it is also well established that taking results over a long period, one will find with increase in candle power a decided tendency to increase in heating value, and vice versa. We believe that the acceptance of this fact is not limited to those "whose contact with the manufacturing department of the industry is but casual." Indeed, experienced gas engineers,

* Private communication.

who are acquainted with the results of a large number of heating value and candle power tests, made simultaneously, have generally accepted the fact that there is a tendency for increase in candle power with increase in heating value, considering the results only in a single process. Of course, this relation would not hold if one type of plant was compared with another.

Humidity Characteristics of Lamp.—From the data in Fig. 3, of his article, Mr. Pierce concludes that the humidity correction for the mantle candle power is 2.716 candles per liter of water vapor in each cubic meter of air. If all of the data in this figure were on a comparable basis, his conclusion would be justified; but it is rather surprising to have all of the influence on candle power credited to the humidity, since in the tests charted the influence of the variation in consumption of gas per hour and the variation in the heating value of the gas is entirely ignored. The figure given for the humidity correction really is a figure of no physical significance whatever, since it is derived by taking the variations which happen to be found when three variables were changing simultaneously, and crediting the total variation to the single variable, humidity. The conclusion drawn from Fig. 3 is, therefore, certainly not in harmony with the facts, and it is not difficult to account for the fact that Mr. Pierce found this factor larger than that previously determined by Mr. C. O. Bond, even taking account of the correction published by Mr. Pierce in the JOURNAL Sept. 6, where it is shown that an error in the original makes the value appear three times the proper figure.

Variation of Duty with Heat Input.—From the data of Figs. 4 and 6, it is possible to draw certain conclusions as to the relation of the horizontal candle power per B. T. U. input per hour, and the heat input per hour; but it is not proper, as is implied by Mr. Pierce's statement, to draw any conclusions from these as to the relation of mantle candle power to the heating value of the gas, since in plotting the data the influence of the consumption in cubic feet per hour has been ignored. In this connection it is of importance to remember that an appliance is necessarily best suited to certain rates of gas burning and certain quantities of B. T. U. per hour.

Relation of Mantle Candle Power to Heating Value of Gas.—From the data given in Fig. 5, one might have difficulty in drawing any definite conclusions if only a visual method of determining the proper position of the curve were used. However, when the data are grouped for each 20 B. T. U. interval of heating value of gas, and the average for each group calculated, a very surprising fact is developed. Over the range from 540 B. T. U. per cubic foot to 640 per cubic foot it is found that the horizontal candle power per B. T. U. introduced in the gas per hour is practically constant; the variation being less than 3%. In other words, *over the range 540 to 640 B. T. U. (which range covers a very large part of the gas manufactured in this country), Mr. Pierce's data show the usefulness of gas for mantle lighting to be directly proportional to the heating value of the gas,* a conclusion very different from that derived by Mr. Pierce from the same data. The average values for the several groups are as follows:

	Candle Power,
All tests below 520	.0435
520 to 540	.0398
540 to 560	.0387
560 to 580	.0383
580 to 600	.0377
600 to 620	.0383
620 to 640	.0385
640 to 660	.0362
660 to 680	.0358

In the chart given as Fig. 1 (same data as Mr. Pierce's Fig. 5) is shown in a dotted line the "curve" designated by Mr. Pierce as showing the relation of heating value to "duty" (mantle candle power per B. T. U. per hour). This line is drawn by him from data shown by the small circles. The averages for each group over a 20 B. T. U range are shown by small crosses; these are the averages listed in the table just given. It is evident that the slope of the line drawn by Mr. Pierce is not correct; if one wishes to make the "curve" a straight line, it should be more nearly that indicated by the broken line (dashes) on the figure. As a matter of fact, the S shaped curve (given as a full line) approaches nearly the exact expression of the results of the measurements.

With gas above 640 B. T. U. per cubic foot it can readily be understood why there should be a decrease in efficiency in use of the heat. The appliance used is not so well suited for so rich a gas; and naturally, in order to secure complete combustion of the rich gas, some sacrifice in efficiency of use of the heat results. Considering the other extreme, gas of less than 540 B. T. U. per cubic foot, one finds a large increase in the usefulness per heat unit. This is undoubtedly due to the fact that the gas used by Mr. Pierce was a carburetted water gas, and when such gas is of so low a heating value per cubic foot it consists very largely of carbon monoxide and hydrogen, both of which are particularly valuable in production of mantle candle power. And it is not surprising, therefore, that when they become the predominating constituents of the gas, the mantle efficiency per heat unit should be greater.

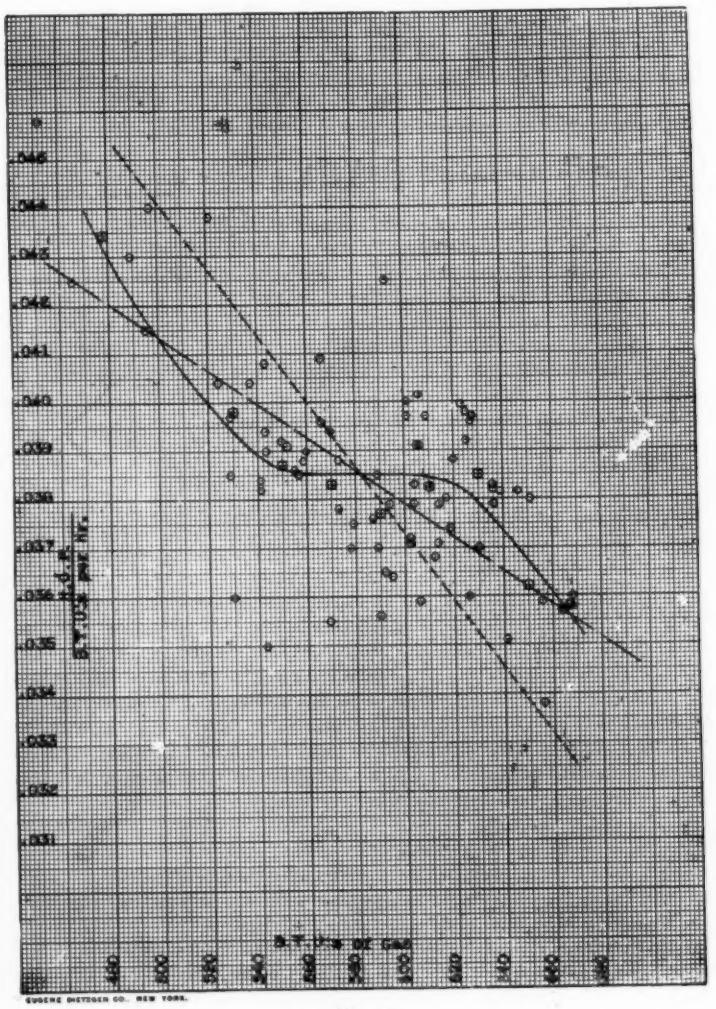

Fig. 1.

It is not certain that averaging the data, as is done in the preceding paragraph, represents the exact truth. However, it seems to be unquestionable that such method of treating the data gives a conclusion more nearly in accordance with the facts that any conclusion that would result from interpretation of a straight line drawn, as is done by Mr. Pierce, through the whole number of tests together. In fact, with the tests as discordant as they are, it is impossible to judge just where the straight line should be drawn through them, even if one insists that the "curve" should be a stright line. As a matter of fact, considering the physical significance of the whole matter it is probable that a straight line would not represent the true interpretation, for it is to be expected that over some considerable range of heating value the appliance would be found to be uniformly efficient, and that beyond these limits a material change in efficiency would be found. If the appliance were designed for a gas of slighly less than 600 B. T. U. per cubic foot, it would be expected, therefore, that for some range below and above this figure the efficiency would be practically constant. Mr. Pierce's data seems to indicate that this is the correct interpretation.

Computation of Humidity Characteristics.—Mr. Pierce has used what he calls "three independent methods" for computing the horizontal candle power in dry air. As a matter of fact, the the three methods he uses are simply three different mathematical treatments of the same data, which could not help producing the same results. It is not surprising, therefore, that the three results are identical. Method two practically amounts to an extrapolation of the straight line given in Fig. 3, to the point where it crosses

the avis of zero humidity. Method one takes each of the results by which Fig. 3 was plotted, and corrects them according to the slope of the line in Fig. 3. This is an arithmetical procedure for accomplishing what is done graphically by extending the curve. The methods are not independent; they should be regarded as practically identical. Furthermore, method 3 consists merely in using the formula of method two, divided throughout the whole equation by the constant H (H being regarded as constant in this case because it is taken as the average value of H for all tests). Obviously, this method could not give a different answer from the other two. The fact that these three methods, which Mr. Pierce regarded as independent, but which are really identical, do agree, should not be used as any criterion of the value of any one of the three, nor of the experimental work.

The Significance of Heating Value Standard for Gas.—As is shown above, Mr. Pierce draws his conclusions as to the significance of a heating value requirement for gas quality largely from his interpretation of Fig. 5, which shows the relation between the heat value of the gas and the mantle candle power per heat unit supplied per hour. As is evident from a proper interpretation of his data, the true curve is very different from that drawn in Fig. 5. Mr. Pierce concluded that "as far as incandescent lighting is concerned it does not make the least difference to the customer whether he pays $1 per 1,000 cubic feet for gas of 480 B. T. U., or $1 per 1,000 cubic feet for gas of 660 B. T. U." This deduction is as unwarranted as it is untrue. *The correct interpretation of Mr. Pierce's data bearing on this point would be that, over the range 540 B. T. U. per cubic foot to 640 B. T. U. per cubic foot, which is practically the total range of gas quality as commercially supplied in the United States, the usefulness of the gas for mantle lighting is almost exactly proportional to the heating value per cubic foot.* It is certainly not true, as Mr. Pierce states, that "the calorific value standard would be as useless, meaningless, absurd, and ridiculous as the present candle power standard when applied to mantle lighting." As a matter of fact, the calorific value is of very great significance in judging the usefulness of gas for mantles, and this is confirmed by the data which Mr. Pierce presents.

Mr. Pierce states on the first page of his article: "This test was planned with a view to demonstrating that calorific value, specific gravity and gas candle power do not definitely specify a gas for commercial purposes." If the thing which was to be "demonstrated" were a generally accepted fact, one could understand how conditions might be so selected as to prove the point anticipated. But in an investigation, the result should not be selected in advance. There is a possibility that the desire to demonstrate the point may unconsciously lead to deductions not warranted by the experimental results.

Babbit Metal.

S. U. TUSPIN, in *Electrical World.*

Originally babbitt metal had a fixed composition, being 90% tin and 10% antimony and copper; but now the name babbitt signifies no definite composition, there being almost as many kinds of babbitt as there are companies selling bearing metals. Instead of denoting an alloy of tin, antimony and copper, the name now covers practically the whole field of white metals composed of tin, lead, copper, zinc and antimony in various combinations. The reason for this diversity in components and percentages is the endeavor to obtain a bearing metal possessing the desired properties at a lower cost than real babbitt. As a consequence, the cheapest babbitts contain a large proportion of lead. The mere fact that a bearing metal is cheap, however, is not to be taken as evidence that its quality is low. The only test of its value is the way in which it stands up to its work, and so nearly every kind of babbitt has its champion, because someone has found it satisfactory in service.

There has been a great deal of trouble in connection with the selection of babbitt metal, caused by reckless statements regarding the value of advertised metals or by the inability of users to select kinds suited to their needs. One bearing metal connot be equally good for all forms of service; yet the mistakes made in selecting grades for different classes of work seems to indicate that little thought is given to the nature of babbitt or to the properties produced by varying the proportions of the ingredients.

A satisfactory babbitt metal for any purpose must be hard enaugh to retain its form under the load or pressure that may be put upon it. It should possess good anti-friction qualities; that is, the co-efficient of friction between the babbitt and the journal should be low. Of course, the quality of the lubricant used on the bearing will determine the friction, but there is evidence that the composition of the babbitt also has an influence. The melting point of the metal should be lower than that of the shaft or journal, and if the babbitt melts through overheating by friction, it ought not to adhere to the shaft. In order that the lubricant may do its best work, the surface of the babbitt should he easily wetted by the lubricant and should hold the film of lubricant. If the surface repels oil, or is not easily covered with a coat of lubricant, heating is apt to occur.

The chemical composition alone is not a safe guide as to the quality of a babbitt, because the manner of making and pouring the metal affect its properties. Babbitt is particularly sensitive to over-heating, and care must be taken not to heat the constituents or the finished product high enough to cause volatilization or burning. The safe temperature depends somewhat on the relative amounts of the different constituents, but a temperature of from 840 to 880°, may be safely used in pouring. In the process of alloying the various constituents, temperatures below 925° F. have been found sufficient. During melting, the surface of the metal should be kept covered with a layer of powdered charcoal to prevent oxidation.

There are two main classes of babbitt, lead-base babbitt and tin-base babbitt, so called because of the predominating elements in them. Of the two, the lead-base metal is the cheaper, because lead costs from one-quarter to one-fifth as much per pound as tin; and is softer than tin-base babbitt, as a general rule. There is also a difference in color, the lead-base metal showing a bluish tinge, compared with the yellowish of the tin-base.

So far as friction is concerned, lead has the advantage over tin as a bearing metal, but a lead-lined bearing is not practicable, except in unusual cases, because lead works loose in the grooves of the box, and also because it is so soft that it may squeeze out under pressure. To remedy these faults, lead is alloyed with tin, antimony and copper.

In any alloy the properties of the combined metals are present in the product, but not in the same degree as in the original metals. As tin is tough and melts at a low temperature, its effect on a babbitt is to give a tough metal and to lower the melting point. Tin does not possess as good anti-friction qualities as lead, and therefore tends to increasee the co-efficient of friction.

Antimony reduces the co-efficient of friction and hardens the alloy; but its addition gives brittleness to the babbitt. It possesses the valuable property of having no shrinkage when poured, and gives a similar property to the babbitt, so that when poured into the box or bearing it stays tight in the slots or grooves.

Type metal is an alloy of about 80 parts lead and 20 antimony. These proportions produce a metal of excellent anti-friction properties and for bearings in which the pressure is not great and the speed not high. The large percentage of lead makes this a cheap metal and therefore in great demand. As a result, the refuse metal of type foundries is worked up into bars and sold as babbitt.

Copper in babbitt increases the friction, but is added to toughen the alloy. Only a small percentage of copper is used in babbitt metals, although the various brasses and bronzes used as bearing metals contain large proportions of copper.

Zinc is useful as a constituent of babbitt because it wears so well, but its anti-friction properties are low and it shrinks greatly while cooling after being poured. It must therefore be alloyed with some metal like tin, to counteract the shrikage. Babbitt containing zinc and tin will wear well under heavy loads at moderate speeds, but it should not be used for high speed work.

A good babbitt must be of uniform structure and composition throughout. To attain this it is necessary to use great care in alloying the various metals, and it is necessary to use high-grade materials.

Even a good babbitt may be spoiled in pouring, either by being overheated or by being poured at too low a temperature. If poured too hot, the metal will be soft, and if too low it will have a course crystalline structure. Of the two general classes, the lead-base metal is more likely to be injured by carelessness during pouring than the tin-base metal. Blow-holes and shrinkage of the babbitt away from the shell of the bearing may be reduced by heating the shell from 200 to 300° F.

PRESENT PRACTICE IN THE SALE OF GAS IN THE UNITED KINGDOM.

Paper by F. W. GOODENOUGH to the Interntional Gas Congress.

[Mr. Goodenough is Executive Chairman of the British Commercial Gas Association; Past Chairman of the International Committee of Commercial Advancement in the Gas Industry; Controller of Gas Sales to the Gas Light and Coke Company, London.]

Every gas undertaking in this country does at any rate carbonize coal, does purify its gas (more or less) and does distribute it through mains and services. But in the matter of selling gas, in the sense of positive salesmanship, and not of mere meter reading and account collecting, the present practice in this country may be said to range from below zero up to summer heat. To vary the metaphor; whilst some gas undertakings have got up a fair head of steam in their selling boilers, some haven't yet thought of lighting the fire.

It would be as easy—and as accurate—to describe present practice in gas salesmanship in this country by giving an account of the policy of one undertaking as it would be to give an account of the educational or the matrimonial laws in one of your States, and present it as present educational (or matrimonial) practice in the United States of America.

To serve any useful purpose, therefore, I must endeavor to give some co-ordinated account of the best practice in gas salesmanship as adopted in some degree or other by the various undertakings on this side. Some have adopted all or most of the methods to be mentioned; a great many have adopted a number of these methods and are constantly extending their progressive enterprizes—for example, some 80% of the industry, measured by output, are members of the British Commercial Gas Association; but still all too many—though a steadily decreasing number—have adopted very few, or none at all.

These last named gas makers just turn gas into their mains, and everything else, except reading the meters, collecting the money and cutting off the supply pretty readily for non-payment, they leave to the consumer.

How far such "below zero" methods of supplying—it cannot be called "selling"—gas may still prevail on your side of the Atlantic I cannot hazard an opinion. I know of and admire the splendid work that has been done by the National Commercial Gas Association in spreading the Gospel of salesmanship founded on efficient service; but I do not think I shall lay myself open to an action for libel if I suggest that there are still some "meter-reading-account-collecting" concerns to be found in the States as well as in this country.

As long as human nature retains its weaknesses there will be some people who, if given a monopoly-right of any kind, will regard it as a heaven-sent annuity that needs the minimum of effort on their part to bank. It is these short-sighted persons, who have regarded a monopoly in gas supply as if it were a monopoly in light, heat and power—and who have failed to realize that, anyhow, a public concession carries with it a duty to do the best possible for the public and not just the power to "do" the public as thoroughly as possible—that have been the curse of the gas industry the world over for all too many years. We, of the British Commercial Gas Association, gladly join hands with you in the work of letting light into these dark places and bringing home, to all who will hear and understand, the truth that real and permanent success is founded upon efficient service.

To enable me to give, in useful form, some account of what is being done to develop gas salesmanship on efficient lines—and my reference to the sleepy hollows must not be taken as implying that they are the predominant feature, for there has been a great awakening in recent years—it may be helpful first to define the essentials of a sound commercial policy for the sale of gas—or, indeed, with adjustment of detail, of any other commodity.

Efficient salesmanship in the gas industry involves, I submit, the recognition of three facts:

(1) If you want every consumer to use as much gas as he can consume with profit or advantage to himself, you must make it easy for him to get an adequate and constant supply, and to get the most efficient appliances for its use. Then you must see that his appliances are kept in efficient order.

(2) If you don't tell every consumer what you and your commodity are willing and able to do for him, he very likely won't know.

(3) If you want to consolidate your business on the surest foundation, you must get it fixed in the minds of every one of your employees that the consumers' interests and those of the business are parallel and not opposite; and your whole policy of dealing with the public—whether it be in giving advice, in rendering service, in receiving and dealing with complaints, or in settling disputes—must be based upon a conviction of that truth.

A policy founded upon these facts necessarily implies:

(*a*) The laying of adequate mains, the installation of capacious carcass pipes, and the maintenance of a good and steady pressure; the provision of slot meters for the poorer class of consumer; easy terms for the supply and fixing of apparatus; well equipped showrooms in suitable positions, staffed with trained salesmen and women; an efficient fitting staff; an equally efficient maintenance staff; reasonable maintenance terms.

(*b*) Effective publicity, including local, district and national press advertising; expert canvassing; lectures, both domestic and scientific; good public and store front lighting.

(*c*) The provision and training of a good commercial and administrative staff, imbued with "the spirit of the house," right down from the chairman of the board to the telephone operator, the office boy and doorkeeper.

My task then is to tell you what is being done in England to ensure the provision of these essentials to sale development.

I will take the items *seriatim*, making my answers general and not particular, it being understood, as already stated, that practice varies greatly as between one undertaking and another.

Laying Adequate Mains.—This comes within the province of distribution, and not sale, which may usefully be regarded as beginning at the main cock of the service. It is becoming fairly well recognized now that it is the truest ultimate economy to lay mains of ample size in all districts. Small mains are a curse and will discount the best selling campaign in the world, for the more successful the salesman in adding to the load the worse the ultimate state of affairs.

Installation of Capacious Carcass Pipe (House Piping).—Inadequate internal piping is own-sister to the small main curse, and they both come quickly home to roost. The best practice is to watch all new buildings in process of erection and to get the architect to schedule, or the builder to provide, for internal pipe of ample size to all points of possible usage, including a supply to every fireplace. (Note may be made of the advantage of getting builders to insert tees in the pipes from the range boiler for the installation of gas-heated water circulators.) Where property owners will not pay the whole cost of adequate carcassing, it is customary to meet them part way—either by doing the work at a reduced charge or paying so much for each point put into the gas manager's specification—rather than have any property finished without a proper installation of gas piping of ample size.

Maintenance of Good and Steady Pressure.—This, again, is a matter for the distribution section. Present practice tends towards much higher pressure than in the "flat flame" burner days, and 30 or 40 tenths is a common pressure at the meter. With a well-maintained initial pressure the variations caused by rises or falls in consumption on the district are not as a rule serious. A variation of 3 or 4 tenths is much less noticeable if the pressure ranges around 40 tenths than if it is in the neighborhood of 15 tenths.

High pressure distribution with governors on each service is slowly growing in this country, but is very limited in application so far.

Slot Meters.—The provision of penny, six-pence or shilling (mostly penny) in-the-slot meters is usual in most parts of the country. There are about 1,000,000 in London alone and close on 4,000,000 in the United Kingdom. It is usual for the gas company to install the meter, pipe the premises, supply cheap fittings, a cooking stove, and in suitable cases a gas fire, and to charge a somewhat higher price for the gas to cover installations and upkeep charges; the maximum additional charge allowed by Parliament is 10d. per 1,000 cubic feet.

The Supply of Gas Fittings and Appliances.—Great improvement has taken place in recent years in the design and construction of gas appliances, especially inverted burner lamps for both high

and low pressure, gas fires and water heaters. The leading manufacturers are expending considerable sums of money on laboratory research and testing work, and some gas managers stimulate this by themselves applying stringent tests to any lighting or fuel apparatus submitted, before accepting it as suitable for sale or hire to the public. The setting-up of a high standard in this way, by gas undertakings that can afford to run laboratories and employ scientific examiners of apparatus, benefits the whole industry by raising the quality of all goods produced. Fortunately the gas fittings and apparatus makers realize more fully than ever the importance of ensuring high efficiency and scientific construction in all appliances for the consumption of gas; and all but the "back number" gas managers realize that the most economical and efficient burner, stove or furnace, and not that which is wasteful of gas, is their best friend in the long run.

Easy Terms for the Supply and Fixing of Fittings and Apparatus.—The hiring out of shop lamps on terms inclusive of insurance, periodical cleaning and mantle-maintenance is steadily increasing. In the leading towns and cities the plan is growing in favor of co-operative lighting for whole streets or groups of shops by high-pressure lamps hired out by the gas undertaking to the individual shopkeepers on long period contracts, the charges covering the supply of gas for an agreed number of hours per annum as well as rent and maintenance of installation. The pressure-increasing apparatus is either located in a cellar or out-house in the neighborhood, if the group is far distant from the works, or at the works itself. Where the distribution system includes a high-pressure main through the district this of course is utilized for such co-operative lighting, as well as for factory lighting and industrial fuel supply.

Domestic and other interior lighting fixtures are usually sold on "small profit" terms, payment being in some cases by installments over a period not usually exceeding two years. The sale of efficient fittings has not been developed by some gas undertakings in this country to anything like the extent it should have been, with the result that consumers are in many cases left to buy shoddy fittings elsewhere, without the benefit of advice from the gas salesman as to what is the most truly economical burner or lamp to purchase.

In regard to fuel appliances, facilities for obtaining the best are much more freely afforded. Some gas undertakings lend gas cooking stoves free of rent, and fix them free of cost, for consumers by ordinary meter. (As already mentioned, almost all undertakings do this for slot meter consumers, though the latter ultimately pay for rent and fixing in an enhanced price for gas). Most undertakings, however, do not go beyond hiring out to their ordinary consumers cookers at moderate rentals, representing usually interest and sinking fund charges, and fixing them at from nothing up to cost price, practice varying materially in the latter respect.

The Question of Free Loan and Fixing.—Personally, I am not a believer in lending stoves free of rent, or in free or "norminal price" fixing, as a general practice. Nine consumers out of ten who will and can afford to make any material use of gas appliances can afford to and will pay for their installation and hire. To adopt a "free rent and fixing" policy is to pay very dearly for the tenth man's doubtful custom. If the average cost of installation be £1 and the hire 10s. a year, you pay £10 down and £5 per annum to get the tenth cooker fixed. There may be, and are, special occasions on which it pays to make concessions in regard to installation charges, but they should, I submit, be the exception not the rule.

It is a very general practice to sell all gas appliances for cash without profit, or with free fixing thrown in, or on the installment plan spread over 3 years. Some undertakings fix gas heaters free or for a nominal sum; but this again appers to me a policy either to be avoided altogether or applied with great discretion. Otherwise, appliances that will only occasionally be used during only one part of the year, will be installed at a cost that 20 years' profit on the resultant sale of gas will not repay. The more general practice is to do the fixing work at cost price, or thereabouts. This also applies to water heaters, in which a steadily increasing business is being done, both in instantaneous or geyser type, and in the storage or circulating type

Co-operation with the Ironmonger.—In some districts arrangements are made for the co-operation of the ironmongers and stores in the sale or hire of stoves, on commission terms. The plan is sometimes accompanied by an arrangement whereby the installation work is done by the local trader at schedule prices. This is principally done where the gas undertaking is under the control of a municipality which does not employ a staff of gas fitters.

In the industrial centers it is becoming usual to afford facilities for the purchase and installation of gas engines; also of furnaces and other appliances for the many applications of gas for industrial purposes. It is also fairly general practice to allow special discounts on gas used for power and industrial fuel purposes, on a sliding scale based on quantity consumed.

Showrooms.—An essential part of the salesmanship organization is a spacious, well-furnished, well kept showroom in the shopping center of the town—or, for a large city, in each principal center. Such showrooms should also be receiving centers for the payment of accounts, the registering of complaints or notices of removal, etc., the placing of orders for coke, and the transaction of other business between the consumer and the firm, so as to ensure as many visitors to the showrooms as possible. They should be staffed by fully trained, corteous and competent salesmen and saleswomen.

Practice varies widely. Many undertakings have showrooms that comply with all the requirements above suggested. They have erected and equipped fine buildings in the best parts of their towns, which are ornament to the locality, an example to the neighboring traders, and a splendid advertisement for the gas industry. Showrooms up to this standard are steadily increasing, and fully justify the expenditure upon them. A good many undertakings have not yet, however, realized the profitable character of this item in the publicity and sales organization, whilst others have gone about the establishment and equipment of showrooms in a very perfunctory and half-hearted manner, with the result that one finds in a back street in the least fashionable part of the town a so-called showroom—attached to the gas works—dusty, ill-kept, and permanently associated with the odors from the works. Between these two extremes—the fine showroom in the leading thoroughfares and the dirty shop in the back street—there are many gradations, but, fortunately, the tendency is all in the right direction, and up-to-date showrooms are constantly being opened.

In the most important industrial centers, special demonstration shops have in recent years been equipped for the display of crucibles, furnaces and other apparatus used in the application of gas to manufacturing processes, and for the making of practical tests and demonstrations for the information of factory managers. They are proving valuable additions to the selling organizations.

The provision of an efficient staff for showroom work is receiving increasing attention, it being realized more and more that the attendants in a gas showroom should be well instructed upon all the technics of gas usage and the routine of relationship between the consumer and the undertaking, as well as familiar with the selling points in connection with each apparatus; as it is necessary that the showroom representative should be capable of advising every visitor intelligently and accurately upon all matters connected with his gas supply. With this object in view, it is becoming usual for showroom attendants to be selected from those who have had all-round experience in the outdoor department, both on the district and in the office.

A feature found in connection with a good many showrooms, and one that has proven its value, is a room in which lectures and demonstrations on gas cooking and other matters of interest to consumers can be carried on.

Lady Advisers.—There is no doubt that considerable advantage accrues from arrangements whereby lady consumers can consult with and obtain advice and instruction from a competent lady adviser; and an increasing number of gas undertakings are now providing a staff of one or more such advisers, who can either be consulted at the showrooms at fixed times, or visit the houses of consumers to give instruction as to the economical and satisfactory use of the appliances there installed.

In the case of small undertakings not in position to employ permanently a lady adviser for working in their district, the British Commercial Gas Association has been able to arrange for them to be put at the disposal of its members for such periods as they may be required.

Fitting and Maintenance Staff.—The next essential, after the provision of efficient fittings and apparatus, and a suitable showroom for their display, is a staff of skilled fitters for the installation and maintenance of appliances in the consumer's premises.

The fact that gas undertakings have now generally taken upon themselves the work of supplying, fixing and maintaining all kinds of gas appliances (for lighting, heating, cooking, hot water supply, power and industrial purposes), has created an urgent demand for a higher degree of technical knowledge and of mechanical skill among the workmen who have to execute works of installation and maintenance, than was necessary before such work formed part of a gas undertaking's business. Steps have been taken, both by individual undertakings and by the Institution of

Gas Engineers, to meet the demand for skilled gas fitters; and a full account of the scheme instituted by Sir Corbet Woodall for the training of men and staff for the sales department of the company with which I have the honor to be connected will be found in the *Transactions* of the Institution of Gas Engineers for 1913, pages 270-329. The essential features of this scheme are a 6 years' apprenticeship course in gas-fitting for boys taken direct from the schools of the London County Council, which body cooperates in the general and technical education of the lads during their apprenticeship; lectures and demonstrations for both workmen and members of the staff; and an annual examination (in two grades) for determining the general intelligence and technical knowledge of the students.

The steps taken by the Institution of Gas Engineers to further education in the distribution side of the industry, resulted first in the annual examination held by the City and Guilds of London Institute being subdivided into the two subjects of "Gas Engineering" and "Gas Supply," instead of the one subject of "Gas Manufacture and Distribution;" and, subsequently, in the establishment of an annual examination, both practical and written, in "Gas Fitting," designed to further the education of gas fitters and render possible their certification. The first examinations under this scheme was held this year. The course of instruction and examination is intened to cover at least 3 years, divided into Grade 1, Grade 2 and Final. The syllabus for this examination will be found in pages 95–98 of the *Transactions* of the Institute of Gas Engineers for 1914. It is hoped that the steps taken will, with the cooperation of the technical education authorities throughout the country and the addition of local or district schemes for the training of lads in the technics of gas distribution and consumption, gradually lead to a body of skilled workmen large enough to enable every gas undertaking to provide itself with a sufficient and efficient staff of men for both fitting up and maintaining every type of gas fitting and appliance.

Maintenance of Burners and Apparatus.—The need for maintenance to follow installations of gas appliances is becoming generally recognized. It has first resulted in arrangements for the periodical cleaning and remantling of consumers' burners and lamps, and such mantle maintenance schemes are pretty general throughout the country.

They are generally worked on one or the other of two plans. Under the first, the consumer contracts to pay a fixed quarterly or annual charge per burner for periodical overhauling and the supply of all materials. This work is generally undertaken at a loss, the charges covering little more than the cost of the materials supplied. The other plan is for the undertaking to send men periodically to examine and clean the burners, globes, etc., making no charge for the labor, but invoicing all materials supplied at something above cost.

The second plan is more favored by consumers in private houses, where a good many burners are only in very occasional use; but for business premises it has the disadvantage that it leaves the decision as to whether mantles shall or shall not be renewed too much to the consumer, who may sacrifice efficiency to economy, with the result that his premises are a bad advertisement for gas lighting; whereas under the first plan the expense of putting on sufficient mantles to keep the lighting in first-rate order, falls upon the gas undertaking, whose obvious interest is to see that the consumer gets the very best light for the gas consumed.

The necessity for maintenance of gas cooking and heating appliances is, perhaps, not quite so generally recognized, though it is really just as important. Every gas cooking and heating stove should be periodically examined, and put in working order, as many gas consumers do not recognize when a gas appliance is out of adjustment, and put up with unsatisfactory results, which create a wrong impression in their minds and in those of others. It is to be remembered that it is more important to retain and consolidate old business than to obtain additional business, and that the former makes the later an easier task. Some undertakings (and the number is steadily increasing) fully realize this, and have established periodical inspection and adjustment of all their consumers' gas appliances. Generally no charge is made, except for new parts. In the case of apparatus on hire, the necessary parts for repair are, of course, supplied free of charge.

Publicity.—Having outlined what is being done to ensure an adequate and constant supply of gas to each consumer, to provide him with the most efficient appliances for the consumption of gas, and to see that his appliances are kept in good working order, there now comes the question of what steps are taken to acquaint the consumer of the facilities that are at his disposal, and the benefits that would accrue to him from his taking advantage of these facilities—in other words, what is being done in the direction of publicity.

In regard to gas lighting, certainly one of the most effective forms of publicity is the installation and maintenace in first-rate order of good public lighting and of brilliant lamps in the windows and outside all the shops; and increasing attention is being paid to both these matters. Great advances in public lighting by gas have taken place in the past 10 years, the advent of both high and low pressure inverted lamps having given a great stimulus to the movement. Examples of inefficient and badly maintained street lamps still remain in some towns, especially where the upkeep is in the hands of the local authority and not of the gas undertaking; but these instances of how not to do it are steadily diminishing in number—either through the gas undertaking bestirring itself to make the town adopt better methods, or through electricity stepping in. Generally speaking, these, and the cases where the municipality owns the electric light works, are the only instances of gas being ousted from the streets. As already mentioned, many undertakings take active steps to push the supply and maintenance of efficient gas lamps for shop front lighting. But both with artificial illumination and other uses of gas, other forms of publicity than outdoor display of effective gas lighting are needful and profitable. This truth, which at one time met with little recognition, has spread rapidly in recent years, and now meets with wide, though not yet universal, acceptation.

As I have already mentioned, the undertakings supporting the B. C. G. A. represent, measured by output, some 80% of the total gas industry of the British Islands—including most of the principal municipal works; and this means that the administrators of these undertakings are in a greater or less degree believers in the advantages to be derived from advertising gas. Personally, I cannot understand anybody who has any belief in his goods or faith in the possibilities of his business not feeling that he is *compelled* to advertise the facts about the goods or services he is prepared to supply; and I am glad to say that the great majority of the gas administrators are beginning to realize that the sale of gas is just as much a commercial proposition as the sale of any other commodity, and cannot increase to the fullest extent unless the same principles are applied to its development as have formed the foundation of the success of other industrial enterprises—one of which undoubtedly is that if you have a good thing to sell you must tell the public all about it, and keep on telling them, if you want them to buy and keep on buying.

Publicity in the British gas industry is now taking three forms —national, district and local.

The National Publicity Campaign.—In the National Gas Publicity Scheme is included the insertion of well illustrated advertisements in publications that circulate throughout the British Islands —indeed through the British Empire, and in many cases throughout the English speaking world. These include publications of popular circulation such as *The Times, Punch, The Strand Magazine*, etc., and the technical, professional and trade papers that appeal to special classes, such as architects, doctors, educationists, sanitary authorities, etc., whom it is particularly desirable to keep informed upon all the possibilities and developments in the use of gas.

The District Publicity comprises the insertion of advertisements in papers that circulate in large but at the same time local areas of the country, such, for example, as *The Manchester Guardian, The Birmingham Post, The South Wales Daily News, The Scotsman, The Glasgow Herald*, and so forth, all of which have large circulation outside the cities in which they are published. The National and District Advertising Campaigns are conducted by the B. C. G. A. with the funds subscribed by the supporting gas undertakings and makers of gas apparatus, the basis of subscription for the former being 2s. 6d. (60 cents) per annum per 1,000,000 cubic feet of gas sold. The total income to the association is at present about £20,000 per annum—far from adequate for the work the executive would like to be able to carry out.

In connection with the National and District Campaigns much valuable work is done in supplying the papers and periodicals with articles and news paragraphs relating to the uses of gas, written by experts in domestic science, sociology and popular literature, as well as chemists and engineers. The articles are welcomed by editors because they are sound as well as readable.

Local Publicity.—The purely local publicity, of course, comprises all the publicity work done in the area of supply covered by each individual undertaking. This includes: advertising in the local newspapers and on boardings; posters, cards and literature in the showrooms; advertisements displayed on the vans and handcarts used for the delivery of apparatus and material in the district, and

the carrying of fitters' equipment; advertisements on or accompanying the accounts rendered and the receipts given to consumers; picture postcards used for the acknowledgment of communications; booklets and leaflets enclosed with all correspondence, or specially distributed to all consumers by the meter readers or by post; advertisements in the programs of such local functions as bazaars, concerts, fêtes, etc., and in the magazines published by the various religious bodies in the district; type-written letters to individual consumers advocating the use of apparatus the records show not in use where they could advantageously be installed; and other forms of publicity for which special occasions may provide opportunity.

In carrying out local advertising campaigns, the undertakings that subscribe to the B. C. G. A. have the advantage of being able to obtain all the printed matter in such retail quantities as they require at the low prices obtainable through wholesale buying. They can also purchase blocks illustrated by first-class artists at little more than the cost of the stereos, as the designs are paid for by the Association. This enables each undertaking to get substantially increased value for every pound spent in its local campaign.

The fact that the National, District and Local Campaigns are all co-ordinate undoubtedly increases the return obtained from the expenditure upon each of the three, as the consumer is bound to be increasingly affected by the cumulative suggestions conveyed by the same advertising talk and pictures being used in all directions. Managers of subscribing undertakings also find great advantage from their connection with the central advertising organization, because the work of planning local campaigns is so greatly simplified by the advertisements already planned and illustrated by experts who have studied the problem, alike from the point of view of the consumer, the gas salesman, and the advertising specialist.

The consequence is that local publicity work is being steadily and rapidly extended in all parts of the country. This is, of course, also due to the force of example exercised through the meeting together of managers from all over the country at conferences where they can exchange experiences and ideas; a result similar to that which has undoubtedly accrued in the States from the magnificent meetings and work of the N. C. G. A.

Personal Publicity Work.—In addiiton to the impersonal publicity work, of which I have enumerated the various forms, there are also the personal forms of publicity such as canvassing and lecturing. A great deal has been done in these, especially in lectures and demonstrations, to popularize the use of gas for cooking, and in canvassing for that purpose and for the installation of gas lighting and heating appliances.

Canvassing, supported by other forms of publicity, has been found particularly successful when a scientifically directed attack is made on special classes of consumers who are not only valuable as consumers, but also of great importance as having influence with the general public. I refer particularly to architects, builders, doctors, teachers, health authorities, etc. In connection with the enlightenment of teachers upon gas matters, mention may be made of a valuable piece of work done by the B. C. G. A., namely, the publication in educational papers of "Notes for Lessons" for teachers, on the manufacture, distribution and use of gas, giving them the necessary material to inform themselves upon and convey to the rising generation the facts connected with the public supply of gas. These have been very popular and have formed the basis of many lessons. Canvassing has also been found useful when directed specifically to particular trades and industries. These are, of course, studied carefully beforehand, so that all the possibilities of gas for each particular consumer approached can be studied and then accurately presented. For such work the salesmen have necessarily to be thoroughly trained.

In addition to the cookery lectures and demonstrations, steps have been taken to engage popular lectures to give public lectures upon subjects connected with the manufacture and use of gas. Such lectures have, with advantage, been arranged in connection with scientific, literary and other debating societies.

Commercial and Administrative Staff.—For carrying out such local publicity campaigns as have been indicated, and for supporting them by a sound commercial policy both on the district and inside the office, the provision and training of a good commercial and administrative staff imbued with the right spirit of service—that is, service having as its object the constant satisfaction of the public—are very necessary. Little deliberate consideration however, has been given to the subject—far less than has been given in America. A good deal, as already indicated, has been and is being done to improve the *technical* training of the staff that has to deal with the requirements of the public, but so far little organized efford has been made to inculcate *commercial* principles and teach salesmanship. British business men appear tc be very generally of the opinion that, like poets, good salesmen are born and not made; but they do not appear to have gone far in investigating the cause of the low birth rate. Whilst they may not be as scarce as good poets, there is a very marked dearth of really first-class commercial representatives; and one of the most vital problems for the gas industry in the future is that of creating, as undoubtedly can be created if the right methods are adopted, a staff of men who will be as skillful in handling the commercial side of gas supply as are the engineers who make the gas, and as will be, presently, the mechanics employed to install gas appliances

There is one point that must not be forgotten, that sound training in commercial principles and policy must not be confined to only those representatives who deal with the public on the district. Such principles are just as essential in the office of the sales department, in the accountant's department, in the manager's office and in the board room. The mental attitude towards the consumer must be right throughout the "house," or much of the good work done by the district representative will be undone at the counter in the showroom, or in the inspectors' office; by the collector, cashier or clerk who has to deal with the consumer's account; or by correspondence between the consumer and headquarters over some dispute or misunderstanding.

It must be remembered, too, that the doorkeeper, the office boy, or the telephone operator, represents the whole concern to the consumer and can do material damage to the reputation of the business over quite trivial matters. There must be no grit in the machine, however fine, if the whole is to work smoothly and profitably. These are the principles that progressive gas undertakings are endeavoring to establish for the conduct of their business.

Conclusion.—I have now given an outline of the present practice in gas salesmanship in England. I am afraid that my colleagues in the States will find in it little, if anything, that is new, for we on this side frankly admit that the need for salesmanship in the gas industry was recognized and that steps were taken towards its supply by the general body of gas managers in the States, before the need was realized by more than a very few leaders of progressive policy in this country; but the passing in review of the various aspects of the problem may have provoked thought and possibly evoked some fresh ideas in the minds of those who have followed me through its examination; and in that event the exercise will not have been altogether barren.

If our review of what has been and what needs to be done leads us to a firmer conviction that, adove all, our policy must be sound from top to bottom, broad based upon the principle of efficient service, and to a clearer vision of how that policy may best be pursued, we shall have usefully spent our time and will go forward to greater success than we have yet achieved. Progressive ideas are spreading rapidly in the gas industry on both sides of the ocean. The National (might it not now be called the American?) Commercial Gas Association has done a great work in that land of progress towards which in these times of stress we more than ever look for co-operation and comradeship. The British Commercial Gas Association is doing its best to forward the cause of efficiency in—may we still call it?—the mother country and her overseas dominions. May we long go forward, side by side, mutually stimulating and encouraging each other, believing with Robert Louis Stevenson, that "an inspiration is a joy forever, a possession as solid as a landed estate, a fortune we can never exhaust, and which gives us, year by year, a revenue of pleasurable activity;" and so travel hopefully together towards the unattainable ideal of perfection, in the service of the public and of the great industry in which we are engaged.

On the N. C. G. A. New York Special.

The New York special carried 180 members and guests, many of the latter being of the fair sex. When it reached Baltimore, Uncle Sam and his two assistants came on board. These masqueraders were C. C. Williams, H. L. Halley and J. L. Talbot, all of Washington, and their favors of cigars and candy, as well as their pleasant greetings, in verse, were well received. Among those on the train were:

R. R. Young,	W. H. Rogers,	A. K. Quinn,
H. H. Ganser,	S. W. Thomson,	O. H. Fogg,
J. B. Myers,	J. P. Zingg,	F. H. Terry,
F. C. Robison,	W. C. Africa,	C. LeClair,
Sidney Mason,	Geo. H. Scranton,	S. Hayward,
A. H. Hall,	A. R. Burr,	W. H. Lawson,
W. C. Phelps,	P. Eves,	H. H. Newman.

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F. A. SOUTHWORTH, Vice-President. SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, DECEMBER 6, 1915.

REPORT OF THE WASHINGTON CONVENTION.

The Eleventh Annual Convention of the National Commercial Gas Association was called to order by President H. B. McLean, at 10:30 A.M., Tuesday, more than 300 delegates being present. Commissioner Newman, of the District of Columbia, welcomed the Association and incidentally explained the method of governmen of the District. E. N. Wrightington responded on behalf of the Association. The roll call and readings of minutes dispensed with, the following reports were read:

Board of Directors, read by Secretary Stotz, told of the meetings held during the year, and recited the many possible advantages to gas companies by the use of the educational features—the Association needs their help, and their employees need the education. Told of work of Publicity Committee, and its services in arranging for window display; of false statements made by competitors, and of the necessity for gas men to watch for them and correct them; the gratifying results from Water Heater and from Gas Lighting Weeks. The "Gas Equipment of the Home" booklet has been bought by 350 companies, and 90,000 copies distributed. Industrial Gas Committee have prepared a valuable set of pamphlets, now on sale. The Mid-Year Conference was a great success and is to be continued.

Report of the Treasurer, W. J. Clark, showed a satisfactory financial condition.

Finance Committee, by W. H. Pettes, confirmed the Treasurer's report.

Public Relations Committee, by E. N. Wrightington.

T. M. Ambler, of Membership Committee, reported a total memship of 2,692.

W. W. Barnes, for Company and Local Sections, reported 18 active sections, and pointed out their many advantages.

W. M. Crane, for Manufacturers' Section, reported close affiliation with Association, and appliance makers in sympathy with all work of the Association. Feel they have accomplished something their first year. They have demonstrated that a small exhibit can be successful, and propose making all future shows like the present one—one space to an exhibitor and all spaces the same size.

President McLean then read his address, which covered very consicely the reports of the various committees; and one thing he said, that would make a good slogan, "Gas Lighting needs no obituary," being received with great applause. He thanked all who had helped the Association, including the trade journals. Vice-President Blyler appointed Messrs. C. A. Monroe, J. D. Shadduck and Jansen Haines, Committee on the Address.

Reports of Nominating and Place of Meeting Committees were put over until later.

Arthur Hewitt introduced a resolution endorsing the change from a candle power to heating value standard, which was carried.

Adjourned for luncheon.

AFTERNOON SESSION.

Opened at 2 P.M. with a short address by Dr. E. E. Pratt of the Department of Commerce on "Foreign Trade as Allied to Gas Interests."

The Paper on "The Principles of Merchandising as Applied to Gas Service," by J. H. Appel, created an interesting discussion, participated in by Messrs. Elcock, Cohn, Macbeth, Myers and others. The paper treated from a merchant's point of view, the leading gas appliances; and the discussion was unanimous that gas companies should continue handling all sorts of appliances.

George Williams not being present, his paper on "Selling Gas Service" was read by Henry Loebell, and discussed by Messrs. Eves, Young, Myers, Hanlan, Pettes, Macbeth and Loebell.

Report of Publicity Committee, read by J. M. Brock, told in detail of the success of Gas Water Heater, and Gas Lighting Weeks; and believed sales would be greater next year.

Reports of "Advisory Committee to the President" and on "Standardization of Gas Appliance Specifications" were read by O. H. Fogg, and while brief, it was pointed out by President McLean, that they both represented much work and interest, as he could testify.

Report of the Advisory Committee on Exhibitions, in the absence of B. J. Kellum, was read by Secretary Stotz. The session then adjourned.

This afternoon the ladies were given an auto ride, and visited the White House and other Government buildings.

The reception to President McLean to-night was an enjoyable function, the attendance large and representative.

WEDNESDAY'S SESSION.

This morning was spent in the show, there being no regular session. See the photograph and description of the exhibits on page 363 of this issue of the JOURNAL.

A crowded room greeted President McLean at 2 P. M., when the afternoon session opened. First on the program was the Report of Committee on Reciprocal Relations with Other Associations, read by J. D. Shattuck. The Report of Illumination Committee, R. ff. Pierce, chairman, provoked a hearty discussion, particularly that part contributed by Mr. Lee of Philadelphia, who told of a gas lighting installation in a church, put in after electric wiring had been installed. Pictures were shown on the screen. Messrs. Macbeth, Litle, Eves, Blyler and Hanlan participated in the discussion. Eichengreen's paper was withdrawn and a paper on "Theory of Lighting," by C. O. Bond and Dr. Ives substituted. Dr. P. G. Nutting's paper on "Fundamental Principles of Good Lightlng" was listened to with interest, although rather technical in nature. This brought the session to an end.

To-night is the theatre party, and after it the supper and dance in the Red Room.

Some one forgot to see that a party ticket was obtained for the New York special, with the result that the Pennsylvania R.R. is richer by $100 or more by adhering to the regular tariff. Better refer this to the Undersight and Oversight Department of the Rate Committee.

By request, there will be no report made of the Differential Rates Committee Meeting which was held this morning.

THURSDAY'S SESSIONS.

The Industrial Fuel session in the convention hall this forenoon, continued the idea of devoting some portion of the convention time to the exclusive consideration of papers relating to industrial fuel and methods of furthering the knowledge of those engaged it that branch of gas sales.

Due to the fact thal the exact hour of the session had not been advertised in the program, many who especially wished to be present, missed the gathering.

The interest of those attending (there were about 150) was manifest, as hardly a person left the hall while the papers were being discussed and expounded.

The Industrial Fuel Committee this year, instead of presenting papers which would be read and discussed at the convention, appear in the subsequent issues of the Association Bulletin, and then be forgotten, decided to have composite papers prepared by experts in the industry, on specific appliance or processes of manufacture, these to be printed and sold by the Association; the idea being that these papers would be the nucleus of a library giving complete information on the subjects.

It was the belief of the committee that industrial men and new business managers would avail themselves of this opportunity, and keep these booklets at hand for reference. It was also thought that these books could be advantageously distributed to gas consumers interested in the particular process treated. That the consumer would welcome and value the gas man's knowledge of his business to a greater degree on account of these books is unquestionable.

The report of the Industrial Fuel Committee was presented by its chairman, Mr. S. Tully Wilson.

The first paper read was that by W. C. Buell, Jr., on "The Theory and Design of the Injector, as adapted to the Blast System of Gas Burning." This paper was prepared too late for printing, but was considered too important to omit. It showed diagramatically the correct and incorrect design of blast injectors, with graphic charts showing the results of many experiments, and expounded the theories most thoroughly.

The discussion by Messrs. Loebell, Pitts, King, Crawston and McKee, developed the fact that others had made similar researches but that their data and conclusions had never been made available. Promises were made that all this information would be presented to the association if desired.

The first Reference Book taken up was the "Application of Gas to Dry Room Practice," by C. E. Chapple, presented by the author. On account of limited time, but slight extracts were read, and Mr. Chapple confined his remarks to an exposition of the possibilities of gas drying not generally recognized, the fundamental principles of drying that must be known to intelligently handle drying problems, and how the subject had been handled. The paper was received with marked interest.

The second pamphlet, "The Application of Gas to Japanning and Laquering," by Edward F. Davis, treated its subject in a masterly manner, and is perhaps the most concise and complete compilation of data ever printed on this important and growing industry. The need of better knowledge of this subject and the gas appliances available for it, is emphasized by the fact that electric competition is beginning to appear. Where the electric man gets a japanning installation it is due to the ignorance or indifference of the gas man. Electricity has absolutely nothing to offer in cost, quality or output that gas properly used cannot better.

"Application of Gas to Steam Boilers," edited by Wm. Eavenson and Thomas King, was not out of the hands of the printer, but the scope of the paper was fully explained by Mr. King. The paper gives information as to the type and makes of boilers available, their merits and efficiency; includes instructions as to steam boiler piping methods; illustrates numerous installations, including costs of operation in many cases.

"The Application of Gas to Metal Coloring," by Jerome Brandes, was presented by its author, who outlined its contents. This is the first paper covering this subject from the gas viewpoint ever published, and is correspondingly valuable.

"The Application of Gas to Hotel and Restaurant Equipment," by Messrs. E. K. Slater, Jno. M. Brock, and Wm. De Freitas, could not be presented on account of the absence of the authors. The book is now in press and will be prized by every hotel and restaurant appliance man who gets it.

"The Application of Gas to Steel and Cutlery," by F. R. Hutchinson, was described by the author. This little volume is so complete and exhaustive, that it may well be termed the industrial gas man's and tool room bible on heat treatment of steel. It gives the gas man unit cost data in many instances, information always sought for and so seldom obtainable.

All of these booklets are on sale by the Association and may be obtained through the Secretary at headquarters.

The General Session this afternoon was opened at 2 o'clock with a full house in attendance.

Hon. Jas. M. Beck was not able to appear to deliver his address, so the first business was the reading of the report of the Board of Educational Control, by Dr. Lee Galloway. Then, in succession, came the report of the Committee on Salesman's Hand Book, by E. E. Bartlett; Accounting Committee, by A. P. Post; International Committee on Commercial Advancement, by Arthur Hewitt; Committee on Domestic Fuel Appliances, by L. T. Blyler; Committee on Heating Refrigeration and Ventilation, by G. S. Barrows.

The Committee on Nominations reported the following selections for officers, and they elected without opposition:

President—Jansen Haines.
First Vice-President—Arthur Hewitt.
Second Vice-President—W. Griffin Gribbel.
Third Vice-President—W. W. Barnes.
Treasurer—O. H. Fogg.
Secretary—Louis Stotz.
Directors—J. B. Myers, S. Tully Wilson, B. J. Kellum, C. R. Stull, T. M. Ambler, C. A. Monroe, H. I. Schutt, R. R. Young, C. E. Babcock, C. L. Holman.

The selection of the place of next meeting was left to the incoming Board, although New York City was tentatively decided upon. Chicago, Detroit and Atlantic City are also bidders for the honor.

The "Gas Meeters" Dinner, to-night, at the Raleigh, attracted 450 men and 449 enjoyed it immensely; only one man kicking that no drinks were served or allowed. Grand Commissioner F. R. Hutchinson presided; W. J. Clark was toastmaster; and the committee in charge comprised R. J. Rolston, chairman; H. B. McLean, W. W. Barnes, I. W. Peffly, L. R. Dutton, J. M. Brock and H. Thurston Owens.

The singing was lead by Charlie Ehrenzeller, and this with numerous vaudeville acts, furnished all the entertainment needed. There were no speeches, except man-to-man, and no dull moments.

During the dinner the ladies had a Whist Congress in the Red Room at the Willard.

Friday morning will be devoted to a last look at the show, and a golf contest or a motor ride for those needing air.

The session in the afternoon will have the reports of three committees to consider, and will then adjourn.

"This is the best convention ever held by the N. C. G. A. from every viewpoint. Interest is intense, levity and joy parties practically unheard of; manufacturers happy at the attention they are receiving; social features most pleasing and attendance gratifying."

The Show Window—Does it Pay?

By S. H. ALEXANDER, to the New Jersey State Gas Association Meeting.

This paper is written especially to make an impression on the mind of the gas man in the small town who is contemplating doing greater things, but who is a little skeptical of the advantages to be gained in his town through a special effort in making window displays.

This man's first thought is that the town is too small,—the public would never notice his windows, even though he made displays,—that he is selling all the gas that is possible to sell in such a town, so what's the use.

I want to ask this man to take a count of the number of people who pass his window in a day. He will probably be surprised at the figure. In the smallest towns where the street, to a casual observer, seems deserted, this has been tried, and shows that all the way from 50 to 200 persons pass in a day.

Even though only 12 persons passed your window in a day, I say that it will pay to use your window space for attractive displays. Twelve persons who are attracted by your window display will tell at least 12 others and these 12 others will in turn see your window and spread the gospel to as many more, and so on. You know how quickly news travels, especially in the small towns.

Make your displays appealingly attractive, and you are bound to make 'em look and wonder, and eventually create a desire, and finally a purchase. Stick to the policy of making each purchase mean a satisfied customer who will tell and show friends and neighbors, and in turn create in them a desire for the appliance.

Do not sell cheap inferior merchandise. Give the best merchandise of its kind for the money, and follow up each purchase with service, and you will be surprised at the increase in sales of gas-burning appliances and also in the increased consumption of gas.

Perhaps you are selling enough gas under present conditions to enable the stockholders of your company to declare a substantial dividend occasionally, but why should you be satisfied at that? Go to it in an up-to-date way, selling service with every purchase and you will soon find that the size of the holders will need to be increased.

The small town gas man has advantages in many ways over the gas man in large cities, in that he is able to keep in close touch with his consumers, give personal advice and suggestions as to using gas to the best advantage, and in the most economical way.

This gives the public confidence in the service the company is rendering, and all that is then required is to create a desire for other things.

This can best be done through your show window displays.

Show window displays need not be very elaborate or expensive; in fact practically little cost is involved in setting up window trims that will tell a story and create a desire.

For instance, in making displays of the GAS RANGE, there are numerous ways of showing attractive features in "The Art of Cooking with Gas." Herewith I give a few suggestions:

Display 1—(cost nothing) The Cabinet range vs. the cooker:

On one side of your window show a fine up-to-date Cabinet range; on the opposite side an old fashioned cooker, with a show card in center with a ribbon leading from card to each range.

The card states in a few words the advantages the Cabinet has over the cooker,—broiling oven, roomy shelf, warming closet, no bending to operate the ovens, etc.

Display 2—(a small cost for cooking material)—The Cabinet Range—Cooking Advantages:

A number of small cards with ribbons attached lead from the front of the window to attractively cooked food placed in the ovens and on the burners of range.

Point out on these cards that while the potatoes or bread is baking in the oven, the same burner will broil the steak, chops or fish in the broiler oven beneath, or that the roomy top accommodates several vegetables besides the tea kettle. The triplicate saucepan might also be suggested to be used on one burner; also that the heat from the cooking top keeps dishes warm on plate shelf, (preach economy).

Display 3—(ranges):

A range placed in rear of window with attractively baked loaves of bread, pies, cakes, etc., on the floor in foreground; cards are used on the cooked food, stating that "4 loaves of bread like this can be baked in the oven of this range in so many minutes at a cost of.....c for gas."

Cooking hints are always interesting to the housekeeper and will create interest and discussion among the women folk in town, and eventually will result in purchases.

Make all your displays educational, and do not misrepresent anything. You will thus get the public's confidence and have them coming to you for advice.

There are many other ways of showing attractive range displays, but space will not permit going into further detail other than to state that demonstrations of cooking or canning in the window occasionally will stimulate sales.

The next appliance in importance is the GAS WATER HEATER:

Display 1—If the window will permit, show an all-gas kitchen with water heater connected with boiler beside the range and other kitchen requisites such as table, chair, pots and pans, a gas light, iron, etc. A card gives the price of heater, cost to operate, etc. (The surroundings should be white and sanitary.)

Display 2—Form pyramids and group a number of heaters about the window. Have one heater exposed, showing copper coil; a description card, perhaps a special price for a limited time, etc., might be used.

Display 3—The Automatic Heater:

Place the heater in center of window, open the door, exposing the construction; connect with gas and water, and lead a pipe to outside of window with a spigot attached. Put a card on inside of window "Just Turn the Faucet," and use other descriptive cards and banners which are ushally furnished by the manufacturer, arranged neatly in the windows.

Display 4—The automatic heater is placed in center with interior exposed, and a number of ribbons attached to frame of glass front of window, are tied to the important parts of the heater, such as the valve, intake, gas burner, copper coil, etc., and cardboard arrows attached to these ribbons point out the part each feature plays in supplying quick, hot water service.

Next in importance is GAS LIGHTING:

Display 1—Borrow a comfortable chair and a table from someone in town; place the chair beside the table in your window; place a pretty lamp on the table and lay a paper or magazine on the arm of the chair. A card with the price of the lamp completes the display.

Display 2—Same as display 1 with the addition of a heating stove (this for use in fall or winter when heat and light are desired in a display).

Display 3—A dining room scene with a modern dome or semi-indirect fixture hung over a dining table, with chairs, etc., arranged as they would appear in the home; also card stating price and advantages of the fixture.

Display 4—Small lamps such as Reflex, C. E. Z., etc. Have tall boxes in rear and low boxes in front on window floor, covered with white or colored paper or cloth, and packages of lamps are shown on each elevation and on floor between, with here and there a lamp exposed showing the complete outfit. Cards stating the name of lamp, quality of light, candle power and price should be used.

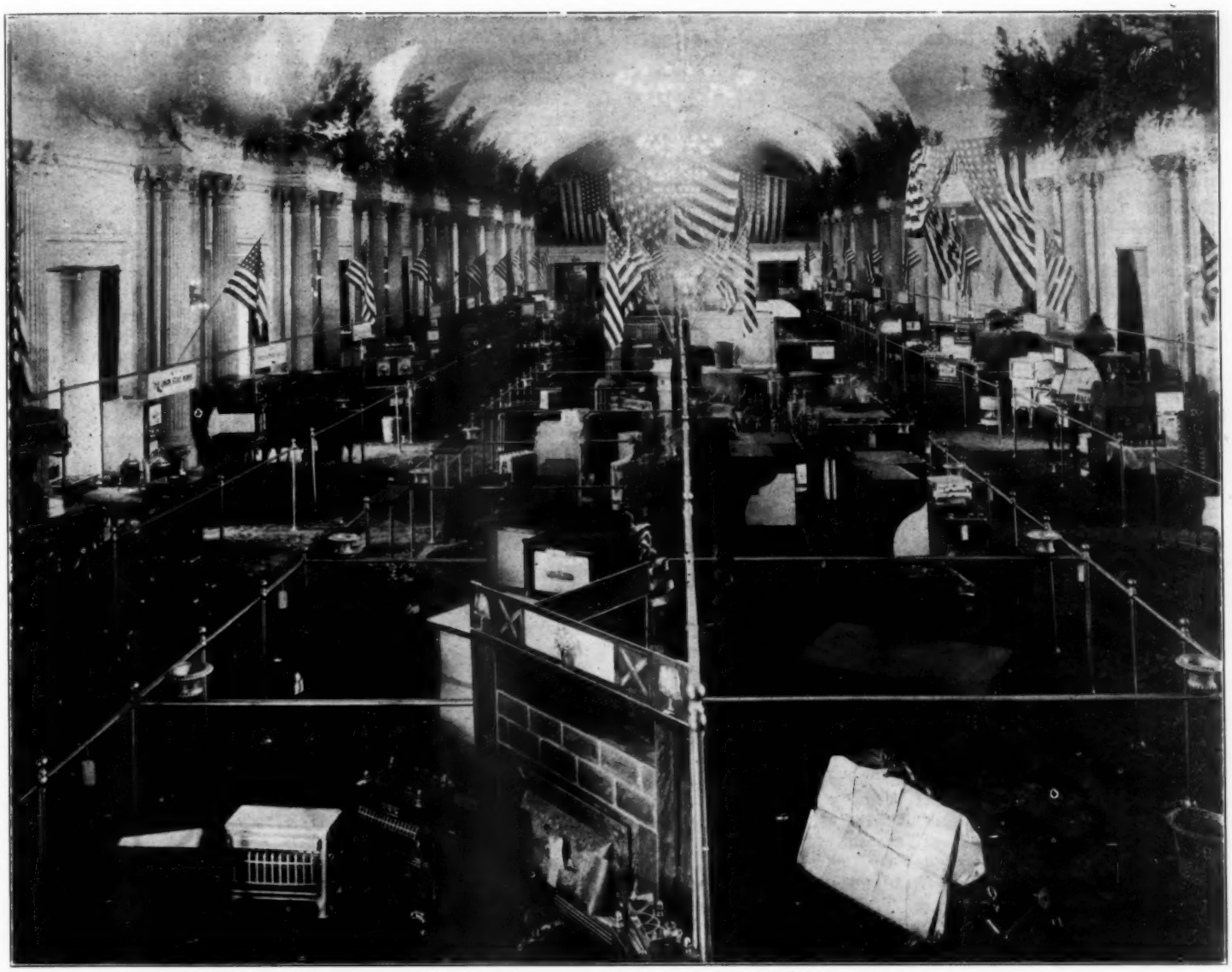
Portable heating stoves may be handled in the same manner as lamp display No. 4, showing the various styles, types and prices on heaters, or just one particular special can be displayed.

I might suggest here that the N. C. G. A. are contemplating supplying to gas companies a window display service which will offer suggestions for timely window trims, adaptable to any window, and the service will be supplied at actual cost, making a very valuable and high grade service at a nominal cost to individuals, available in monthly installments in the form of photographs and descriptions of the displays. Anyone interested should communicate with Mr. Louis Stotz, 61 Broadway, New York City.

In this paper I have merely touched upon the subject of window displays in the gas field and have tried to make it clear to the men who have an "inclination" to go ahead instead of backward that every minute you neglect your window space means a loss to your company in dollars and cents, and I sincerely hope that every gas company, both large and small, throughout the country will soon awaken to the fact that their windows should be made to work for them day and night.

Your windows are a silent salesman, but they can be made to talk, pull and shout, so go to it.

THE SHOW AT WASHINGTON.



This show was distinctive for its aristocratic air—a beautiful Ball room—hundreds of palms and flowers and no *loud* displays or sounds.

We have no record of the number of orders taken, but at no previous show were so many gas men in evidence in the booths examining the appliances.

On account of the small display spaces, only the newest and best goods are shown, and it seemed to be a general opinion that this method was better for both exhibitors and gas men.

The goods exhibited, according to the number of exhibitors, were divided as follows:

Ranges	25	Industrial	3
Water Heaters	9	Specialties	7
Lighting	7	Assessories	3
Heaters	6	Meters and Cocks	5

The exhibitors and those in attendance were as follows:

A. B. Stove Co.—Ranges. T. J. Moran, W. L. Smith, W. H. Nolan, H. F. Cattle, A. J. Reedy.

American Meter Co.—New Style Cubic Foot Bottle. Meter Prover with Enclosed Bell. Portable 1/10 Cubic Foot Bottle. New Style Cubic Foot Meter. Various Styles Improved Siphon Gauges. W. K. Harrington, Ernest Kerstein.

Baltimore Gas Appl. & Mfg. Co.—Ranges and Water Heaters. H. W. Hunter, I. C. Ratcliffe, M. W. Longfellow, W. A. Richards, W. T. Reid, R. P. Crawford, W. T. Hunter, G. E. Winder.

Bayley & Sons, Inc.—Clover Pattern of Equalite Product. W. W. Barnes.

Geo. H. Bladgett Co.—Cabinet Portable Gas Ovens. Geo. H. Holden, Prest.; J. S. Patrick, Treas.

Brassart Fixture Co.—Gas Fixtures. N. W. Belmuth, Henry Popkin.

Champion Stove Co.—Gas-Coal Range. H. T. Edmiston, C. J. Stratton.

Geo. M. Clark & Co., Div.—"Clark Jewels." R. K. Clark, I. W. Peffly, C. A. Young, W. R. Stafford, Frank Schulty, J. C. Brown, E. J. Seeley.

Cleveland Heater Co.—Water Heaters. Leo Friedman, Arthur Friedman, M. R. Stewart.

J. B. Clow & Sons.—Gas-Steam Radiators. F. E. Hutchins, E. H. Wales, E. M. Proctor, W. F. Latimer.

Crandall-Pettee Co.—Reel Gas Oven. Paul J. Delaney.

Wm. M. Crane Co.—Vulcan "All Hot Top" Hotel Range, Single Oven and Cabinet Ranges, Water Heaters, etc. W. M. Crane T. J. Potter, H. W. O'Dowd, C. F. Timm, H. L. Schutt, H. N. Christmas, G. M. Howsmon, J. P. Maxwell, M. G. Allen, et el.

Detroit Stove Works.—Jewell Ranges. C. J. Aaron, A. E. Crevistan, A. J. Fischer, Jos. Carr, H. A. Barber, H. D. Schall.

Eclipse Gas Stove Co.—Ranges and Table Appliances. S. D. Roper, Geo. Parker.

Eriez Stove and Mfg. Co.—Gas Ranges, Heaters, Laundry Stoves. J. E. Nason, W. R. Epp, C. Freund.

Estate Stove Co.—Range, Combination Stove, Incinerator, New Fireless Cooking Gas Range. D. F. Kahn, B. B. Kahn, J. D. Taylor, Jr., J. C. Rushin.

Franklin Co.—Gas Fired Steam Radiators. W. R. Killinger.

General Fire Extinguisher Co.—Rector Heating Appliances. Geo. S. Barrows, T. M. Mayer.

General Gas Appliance Co.—"Triplex" and "Simplex" Ranges, Gas Fired Steam Boiler, Drinking Glass Sterlizer, Pipe Burners and Water Heaters. C. B. Elmer, D. P. Holmes, W. H. Rogers.

The General Gas Light Co.—Gas Arc Lamps, Radio-X Burners, Mantles and Gas Irons. A. H. Humphreys, W. T. Weadley, J. P.

Conroy, G. A. Humphrey, H. E. Humphrey, J. M. Coles, H. R. Humphrey, E. D. Brewer, W. M. Blinks, J. H. Howard.

Gilbert & Barker Mfg. Co.—High Speed Steel Gas Furnace. N. G. Phelps

Hale & Kilburn Co.—Gas Ranges. J. A. Bower, R. B. Caverly, J. R. Strain, C. C. Gilbert,

Handy Mfg. Co.—Automatic Water Heater.

Hays, Mfg. Co.—Service Cocks, Meter Cocks, Service Boxes, Tapping and Drilling Machines. C. E. Mueller, A. L. Piper.

Helme & McIthenny.—Regular and Prepayment Meters, Slow Speed and "A," or High Capacity Meters. Wm. L. Brown.

Humphrey Co.—Automatic Gas Water Heaters, Instantaneous Bath Water Heaters, All Enamel Tank Heaters. H. S. Humphrey, J. T. Radcliffe, T. E. Grant, S. E. Chubbock, F. A. Lemke, R. L. Marques.

Improved Appliance Co.—100 Photographs of Industrial Appliances. S. Tully Wilson.

Int. Hale Gas Mixer Mfg. Co.—Gas Mixers. Bunsen Burners. S. H. Hale, C. L. Henderson, C. R. Jones, Thos. Hulsey.

Kitson Co.—Gas Cocks. Service and Meter Appliances. H. S. Fife, J. W. Graham.

Lawson Mfg. Co.—Tank Water Heaters. G. R. Mailey, H. O. Anderson.

Lombard Governor Co.—Warren Magnetic Valves. A. V. Garratt, F. L. Elder.

Lang-Landreth-Schneider Co.—Automatic Instan. Heaters. Combination Storage System. Tank Water Heaters. H. J. Lang, J. V. Landreth.

Lovekin Water Heater Co.—Automatic and Non-Automatic Water Heaters. W. D. Peck, H. G. Peck.

Mead Gas Heater Co.—Cas Logs and Gas-Steam Radiator. R. E. Lent, C. E. Mead.

Meek Oven Co.—Baker's Ideal Fryer. G. B. Meek, F. W. Piper.

Michigan Stove Co.—Gas Ranges and Gas Water Heaters. L. B. Young, J. V. Peck, S. W. Hemphill, T. J. Lyons, Max Schutye.

Milwaukee Gas Specialty Co.—Gas Range Lighters. W. H. Duggan, A. C. Rutz, O. F. Pfeil.

National Stove Co.—Direct Action Gas Ranges. Thos. Rath, S. E. Little, B. E. Meacham, C. A. Moore.

New Process Stove Co.—Gas Ranges and Heaters. J. G. Way, M. A. Passons, W. G. Vaught, W. G. Withers.

Oxweld Acetylene Co.—Welding Apparatus. L. A. Ogden, M. A. Dantzler.

Peninsular Stove Co.—Gas Ranges. A. B. Moran, Hugo Koehler.

Pittsburgh Water Heater Co.—Automatic Water Heaters, and Lion Tank Heaters. R. C. Frampton, T. J. Smith, C. D. Ten Eyck, J. C. Bowery, R. A. Lovett, W. A. Buerkle, B. W. Dole, W. E. Hill, R. L. Mitchell, C. A. Backstrom, F. C. Wells, J. J. Edson, E. Morris, C. W. Boteler.

Ringen Stove Co.—Quick Meal Ranges. R. L. Kahle, C. S. Smith.

Rathbone, Sard & Co.—Gas Ranges and Gas and Coal Combination. R. E. Sard, G. M. Millspaugh, C. C. Williams, J. E. Shirra, C. J. Breen, J. J. Garrison.

Reliable Stove Co.—Ranges and Heaters. C. A. Case, H. C. Fritz, R. Wilson, P. W. Hennings, E. B. Nicolaus, F. J. Nicolaus.

Reznor Mfg. Co.—Reflector Heaters. Chas. Harbison, J. W. Ayer.

Roberts and Mander Stove Co.—Quality Gas Ranges, Combination and Gas. C. V. Roberts, Stanley Grady, R. L. Mass, J. W. Guise, H. P. Dains.

Rosenbaum Mfg. Co.—Tailors Irons. M. Rosenbaum.

Ruud Mfg. Co.—Instantaneous Automatic Water Heaters, Cottage Water Heaters, Tank Heaters and Incinerator. E. Ruud, A. P. Brice, W. T. Snow, T. C. Savory, C. L. Fairfield, C. E. Bartlett, et al, E. H. Oswald.

Safety Gas Lighter Co.—Friction Gas Lighters. Geo. S. Kelly, J. D. McLean.

Sentinal Mfg. Co.—Automatic Cook Stoves and Timers. C. H. Bowman, A. Tyler.

Shapiro & Aronson.—Safety Gas Cock, Gas Fittings and Gas Fixtures. Messrs. Doyle and Praitsching.

J. B. Slattery & Co.—Gas Fired Steam Radiators, Reflector Heaters, J. B. Slattery.

Isaac A. Sheppard Co.—Gas Ranges. H. R. Sheppard, J. S. Allison, H. W. Plucker.

Sill Stove Works.—Combination Gas and Coal Range. R. W. Rogers, F. Will, Philip Will, T. A. Soults.

Stack Heater Co.—Gas Water Heaters, Boiler Tees and Relief Valves. E. S. Stack.

E. C. Stearns & Co.—"Incinerite." H. V. Collins, E. A. Hurdman.

Storrs Mica Co.—Shades for Welsbach Lights. C. P. Storrs.

Strause Gas Iron Co.—Gas Irons. Louis J. Strause, Harry Strause.

Tate, Jones Co.—Industrial Appliances, Oven Furnace, Bench Forge. W. C. Buell, Jr.

Thomas, Roberts, Stevenson Co.—Gas Ranges. C. M. Ambler, E. J. Post, Jr., A. B. Valentine.

Union Stove Works.—Ranges. G. C. Pennell, A. F. Glaessue.

Utica Valve and Fixture Co.—Gas Cocks, Brackets and Fittings. J. W. Calder, Jas. Rudd, Jr.

Weir Stove Co.—Ranges. R. M. Leach, M. E. Abbott, F. S. Jolsan.

Welsbach Co.—Lights. C. W. Wardell, B. K. Johnson, J. R. Stetser, I. J. Banner, Sidney Mason, R. J. Rolston, E. S. Chapin, T. H. Piser, A. Mason, F. N. Hamerstrom, H. Richman, F. G. Carbus, T. Stites, R. F. Pierce, T. Flanner, R. M. Thompson.

Many of the Commercial Managers instructed their men to make an individual report on the exhibits, and on Wednesday morning there were many squads making inspection tours.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,155,665–66. Meter. Frank Lambert, New York city.

1,155,667. Fluid Meter. Frank Lambert, New York city.

1,155,742. Meter Protection Device. F. A. Le Fever, Buffalo, N.Y.

1,155,753. Manufacture of Sulphate of Ammonia in the Purification of Coal Gas. John MacKenzie, Middlesborough, England.

1,155,758. Combined Coal and Gas Range. S. C. Rockman, Philadelphia, Pa.

1,156,022. Process of Purifying Gas. M. P. P. Riis, Seattle, Wash.

1,156,087. Flame-Shield for Gas Stoves. E. P. Kupler, Leonia, N. J.

1,156,347. Gas-Valve. H. A. Cochran, Houston, Tex., assignor to American Automatic Water Heater Co.

1,156,530. Meter-Box. H. H. Howell, Hope, Ark.

1,156,735. Gas Fire. W. A. Wilson, Armley, Leeds, England.

1,156,999. Combined Coal and Gas Range. G. E. Heibreder, Quincy, Ills.

1,157,089. Method of Making Gas. S. M. Darling, Chicago, Ills.

1,157,225. Method of Manufacturing Illuminating Gas from Liquid Hydrocarbons. E. C. & L. B. Jones, San Francisco, Cal.

1,157,368. Coke Oven. F. J. Collin, Dortmund, Germany, assignor to Aktien-Gesellschaft fur Kohlendestillation, Dusseldorf, Germany.

1,157,555. Apparatus for the Manufacture of Incandescent Mantles. E. L. Knoedler, Gloucester City, N. J., assignor to Welsback Light Co., same place.

1,157,734. Bunsen Burner. L. J. Strause and O. Spahr, Philadelphia, Pa., assignors to Strause Gas Iron Co., same place.

1,157,911. Gas Ignitor. M. M. Traux, Jerome, Pa.

1,158,066. Gas Scrubber. R. Maclaurin, Stirling, Scotland.

1,158,180. Machine for Cutting Mantle Blanks. S. Cohn, New York city, assignor to Mantle Machinery and Patents Co., same place.

1,158,249. Cluster Indandescent Lamp. H. Lyon, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

1,158,397. Automatic Time Lighting Mechanism. H. E. Warren, Ashland, Mass., assignor to The Lombard Governor Co , same Place.

1,158,471. Meter Receptacle. T. W. Felstead, Detroit, Mich.

1,158,652. Gas Furnace. J. B. Doyle, Hamilton, Ontario, Canada.

1,158,986. Gas Burner. C. G. Cronwall, Chicago, Ills.

1,159,073. Device for Separating Liquids from Gas or the Like. F. Nies, T. Vogel and F. Berg, Mannheim-on-the-Rhine, Germany.

1,159,239. Gas Range. F. C. Ludlow, Cincinnati, O.

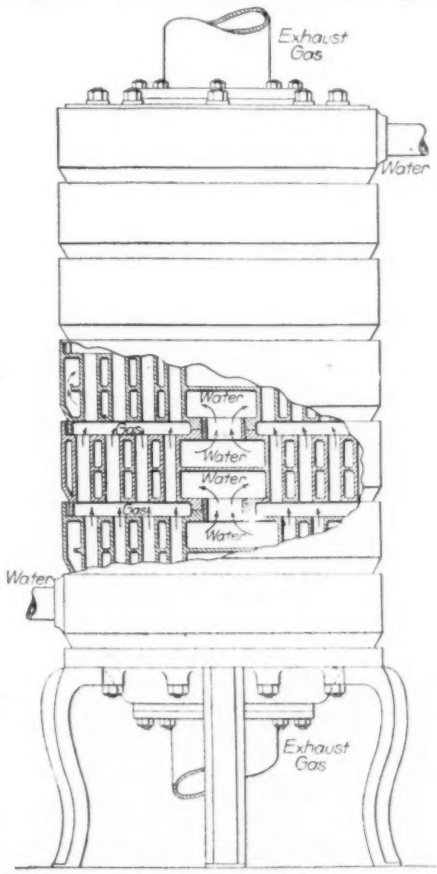
1,159,351. Burner Box for Gas Ranges. A. B. Bell, Philadelphia, Pa., assignor to Hale & Kilburn Co., same place.

1,159,675. Method of Manufacturing Gas. J. W. Hornsey, Summit, N. J., assignor to General Reduction Gas and By-Products Co.

1,159,896. Gas Range. R. B. Caverly and A. B. Bell, Philadelphia, Pa., assignor to Hale & Kilburn Co., same place.

New Methods and Appliances.

WATER HEATING BY GAS ENGINE EXHAUST.—For utilizing the heat in the exhaust gases from internal combustion engines, the Sims Company, has brought out a heater known as the Sims gas engine economizer. It is constructed of cast iron, in round sections that are built up in number and size according to the horse power of the engine. The sections are faced to give a metal-to-metal joint, and connected by screw-threaded sleeves. Each section has a flange or circumferential groove forming a keystone shaped orifice with the adjoining section which is calked with suitable packing material. Passages for the exhaust gases in each section are of sufficient area to avoid back pressure on the engine, and when the heater consists of two or more sections, these passages are staggered from section to section so that the hot gases are brought in contact with the greatest amount of heating surface. The water spaces completely surround gas passages.



A Heater Utilizing the Heat in the Waste Gases of an Internal Combustion Engine as Well as that Radiated through the Cylinder Walls into the Water Jacket.

The heater can be used for producing low pressure steam (20 lbs. maximum) which can be utilized for heating or for industrial service when a limited amount of low pressure steam is required, or for providing a hot water supply. The system can be arranged so that the heat from either the cylinder jacket or the waste gases from the exhaust, or both, can be utilized. For generating steam the system includes a closed storage tank with a centrifugal circulating pump and a safety valve set at a desired pressure. It is said that heat from the exhaust alone will convert $2\frac{1}{2}$ to 3 lbs. of water into steam at 5 lbs. pressure per horse power hour. Even if there be no use for the heated water or steam, the installation of a heater will be along the line of economy by reducing the gas consumption, because of the better engine working conditions resulting from recirculating the jacket water at a uniform high temperature.

The inlet from the exhaust to the heater may be at the bottom and the outlet to the atmosphere at the top, or the reverse. When conditions require it, a horizontal installation may be provided. Various combinations can be worked out by the arrangement of water connections on different sections of the heater, such as heating water at different temperatures and making steam and hot water at the same time. In a typical installation designed for furnishing hot water heat for a building, the jacket water passes from the top of the engine to the bottom of the heater, from the top of the heater to the heating system and then back to the engine. An automatic temperature regulator should be part of such an installation to guard against excessive temperature when the demand on the system is light.

A table prepared by the makers indicates that a 10-horse power gas engine will heat with both exhaust and jacket in 1 hour, 873 lbs. of water to 150° F., and 545 lbs. of water to 210°. From the exhaust alone 365 lbs. of water will be heated to 150°, and 220 lbs. to 210°. The heater for a 10-horse power engine is 12″ in diameter, $18\frac{3}{4}$″ high, and comprises three sections.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

Your Lighting Problem.—Under this title the lamps of to-day for commercial lighting handled by the Brooklyn Union Gas Company, are well described and illustrated in a booklet of 16 pages. Half of the book is given over to illustrations and prices of arc, semi-indirect and single mantle units; and the other half to reproductions of installations.

Under the guidance of Mr. T. M. Ambler, the operating end of the commercial department in charge of Mr. C. I. Hodgson, has shown the same marked improvement as has the selling end, and this piece of advertising matter is a credit to its author and the company.

Gauges.—Plenty of general information on pressures and pressure gauges is giveff in Bulletin 14A of the Connolly Iron Sponge and Governor Company. Every gas man should be on their mailing list.

Heating Campaigns.—The advertising methods available for pushing room heaters are illustrated in the November number of the N. C. G. A. Bulletin.

British Gas Engineers.—A valuable historical volume has been issued by that veteran author Mr. C. W. Hastings, on 50 years of the Institution of Gas Engineers. Portraits, papers and personals make up most of its contents.

Measuring Devices for the Household.—Among the numerous devices described by the Bureau of Standards in Circular No. 55, we find the Gas meter and also the lights, etc., that use the product. Although many complimentary things are said of the meter, the report also contains the following: "However, serious errors in gas meters do occasionally occur, especially in the districts without the services of a good inspection department, and it is well for the consumer to be aware of this possibility."

Light.—"The Meaning of Insurance," by Mr. Samuel Alman, is the leading article in the little magazine published in the interest of the Flatbush (N. Y.) Gas Company Employees' Association. Editor Robinson has many items in light vein which should help to keep the boys going.

Gas Irons.—"A gas iron that will not flash back, heat the handle or give off an odor, and which will do several admirable things," is what the Queensboro Gas and Electric Company says about the Humphrey iron.

Baralong Women Cooking.—Many items about gas and other things are to be found in the November issue of the Vulcan Bulletin.

Dye-stuffs in Japan.—The October 15 issue of the Journal of the Imperial Gas Association states, that the much needed dye-stuff company has not been formed, as the political phases are still unsettled. Have they a Dr. Norton in Japan?

A Home Lamp.—A wonderful advance in gas lighting efficiency, economy and design, are the features described in the new catalogue on the Radio-X lamp of the General Gas Light Co. The mechanical side is described as well as the style and character of glassware. The unit is also shown equipped with an electric bulb for use on combination fixtures. This is the first home light to be offered by this house, and if the same efforts are expended upon it as upon their arc lamps, an added impetus will be given to gas for lighting.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE "Doherty News" says an inquiry made of R. G. Griswold, Chief Technologist of the Doherty Organization, by a Middle-West concern, for drip liquor from gas mains, reveals the demand in this country for the ingredients of picric acid. Gas drip oil is desired because of the benzol, toluol and xylol it contains, all necessary in the manufacture of picric acid. Mr. Griswold is estimating the quantity of drip oil that might be furnished by the gas companies in the Doherty organization.

LOWELL, Mass., is asking for bids for gas lamps in several streets, 1,470 lamps, more or less. The usual gas light contract extends over a period of 5 years.

THE United Gas and Electric Company's November bulletin says, "Business conditions in the cities in which our various properties are located are most encouraging." As these cities include New Orleans, Birmingham, Little Rock, Memphis, Chattanooga and Houston—The American Cities Company combination—this report is most gratifying. The bulletin, after depicting depressed war conditions in street railway, gas and electricity business, adds: "Conditions are now rapidly improving, Manufacturing plants, instead of being on short time, are working full time; instead of being closed down are increasing their capacity as rapidly as possible."

THE Fort Madison (Ia.) Electric Company has been conducting a series of tests to show the camparative efficiency of various forms of lighting units, by taking photographs at night in the stores in Fort Madison. In order to contrast the illumination secured, each plate received exactly the same exposure.

H. H. BYLLESBY is now making a tour of inspection of the California properties under the management of H. H. Byllesby & Co. and will spend several days in San Diego, Los Angeles, Stockton and San Francisco, returning to Chicago early in December.

THE Stacy Brothers Gas Construction Company's new plant on Carthage avenue, Cincinnati, is completed and busy. Several large contracts have been taken by the company, and they report business as picking-up.

C. H. MASON, formerly of Hornell, N. Y., has been appointed manager of the Dansville (N. Y.) Gas and Electric Company, succeeding C. G. McAvoy.

THE George M. Clark & Company division of the American Stove Co., announce a new location of their New York branch. It is 209 West 43rd street, New York City.

THE Public Utility Association of West Virginia, its membership comprising the electric-railway, electric-lighting, water, artificial-gas and telephone companies of West Virginia, held its first convention at White Sulphur Springs Nov. 18 and 19.

The "Gas World," London, reports a shortage of fireclay, and says that: "At a meeting of the Miners' Federation Executive a letter was received from the Home Office suggesting that the Federation should consider the suspension of the Mines Eight Hours' Act so far as it applies to fireclay mines, as considerable difficulties were being experienced in connection with the manufacture of munitions by reason of the shortage in the supply of particular kinds of fireclay."

THE Tuscaloosa (Ala.) Belt Railway and Utility Company have placed contracts with the Municipal Engineering & Construction Company of Atlanta, Ga., for the completion of their gas mains in Tuscaloosa. About $12,000 will be expended. The problem of gas for Tuscaloosa has been before the people for some time, and the announcement made by the company is received with general satisfaction. Work will begin December 1, and it is stated that by March 1, 1916, the plant will be in operation.

THE Standard Utilities Corporation, New York, has been chartered, with $2,000,000 capital, to conduct a general utility business, including the generation of electricity, the manufacture of gas works, plants, etc. Anselm P. Anderson and Joseph F. Curtin of New York are named as incorporators.

COLONEL GEORGE D. ROPER says: "The salesman who spreads the news of hygienic and labor-saving devices is accomplishing something else besides merely increasing the business of his house. He is a civilizer. The man who introduces gas lighting in an out-of-date community draws attention to the hygienic value of a better light and the importance of the proper care of the eyes. The salesman of domestic appliances teaches economy of time, labor and health. Similarly, the salesman of all other gas devices gives instruction in something worth while."

IT was reported at the annual meeting of the Consumers' Gas Company, of Toronto, that more than 200 of its men had enlisted in the Canadian troops. Liberal assistance has been granted their wives and families by the company, making it unnecessary for any of them to become a charge upon any public fund. Special subscriptions among the employees who had not enlisted realized $3,300. President A. W. Austin said they were proud that such a large percentage of their employees had enlisted, and they were keeping their places open for them.

PHILADELPHIA papers praise the lighting effects in the Cathedral of St. Peter and St. Paul. "A striking feature of the renovation of the Cathedral of St. Peter and St. Paul, completed just before the golden jubilee celebration, is the semi-indirect gas lighting system. The light is designed to bring out the artistic decorations, paintings, frescoing and general architecture of the interior to the best advantage. Twelve gas units giving a combined candle power of approximately 16,000, hang in the arches in front of the rows of altars and furnish abundance of illumination for the upper portion of the church, and also shed light upon the pews. A big feature is the eye-comfort felt by the worshipers. The light permeates the whole interior with a soft glow, and is in keeping with the impressive Cathedral interior. The installation is the most notable example of church lighting to date. The lighting specialists of the United Gas Improvement Company had in mind the artistic features of the Cathedral. The lighting units are designed to conform to the decorations and architecture of the period of which the Cathedral is a notable example. Each bowl hangs on three strong fluted arms, and the massive rims are decorated with heavy brass cast acanthus leaves. The fixtures hang gracefully from the centre of the arches. The lights are about 42" in diameter, and hang 25 feet from the floor. The lighting is strongest near the main altar. On each side in the rear there are three units with 12 mantles each, while the three units on each side near the altar have 15 mantles each."

THE Suburban Gas and Electric Club, Revere, Mass., held a "Military Night" at their regular November meeting, and had as invited guests President A. B. Tenney of the Suburban Gas and Electric Company, and Dr. A. L. Cheney. After a bountiful home cooked supper, these two gentlemen gave illustrated talks on the Plattsburg military training camp. President Tenney, who was a member of the first camp at Plattsburg, showed nearly a hundred views of the life of a soldier, and Dr. Cheney showed a number of pictures along the same lines. President Tenney was then tendered a complimentary review by 7 members of the club who lately enlisted in the Supply Company of the Eighth Regiment M. V. M. The men were under command of Appliance Manager H. M. Frank, a Spanish War Veteran, and retired Quartermaster Sargeant of the First Massachusetts H. A. On behalf of the Club, Mr. Frank presented Mr. Tenney with a neatly bound volume by a renowned auther, entitled "War."

THE Gainsville, Fla., Co-operative Ice Company is said to have bought the holdings of the Gainesville Gas and Electric Power Company. The new company is backed by the Securities Guaranty Company of North Carolina, which has been working on the new company for some time.

THE Consolidated Gas, Electric Light and Power Company, of Baltimore, makes the following announcement relative to the 75-cent rate for gas, which becomes effective January 1 next: "In sharp contrast to the constantly increasing cost of practically all

other necessities of life is the decreasing cost of gas. Baltimore to-day enjoys one of the lowest gas rates in the country. On January 1 next the net price will again be reduced, the reduction being from 80 cents to 75 cents a thousand cubic feet. This unusually low rate will give the people of Baltimore an economic advantage over those of neighboring cities. The rates for electricity in Baltimore are the lowest on the Atlantic Seaboard. The new gas rates give Baltimore the same advantage with both commodities supplied by the company. The 75-cent net rate is applicable to all gas consumers and practically everybody in Baltimore will share in the reduction. The different rates for gas for large industrial users provide a further advantage for Baltimore." During the month of October the Gas Company made a net gain of 445 in new customers for gas and 616 for electricity consumption. The total cubic feet of gas sold during the month was 396,966,400, compared with 395,505,600 for the same month last year.

THE Halifax, N. S., "Chronicle" says: The new gas works of the Halifax Electric Tramway Company, Ltd., is to be located on the east side of lower Water street near the company's car station, and the containers will be on the opposite side of the street. An addition, 54 by 10 feet is to be made to the office building also, and work will soon be begun.

EMPLOYEES of the distribution department of the Public Service Gas Co., Newark, N. J., have organized a social club. Officers have been elected and plans started for its first entertainment, which will be a smoker, to be given on Dec. 20. The arrangement committee consists of Abraham Lawrence and Joseph Moss. The officers are: President, John A. Clark; Vice-President, T. J. Reickeldorfer; Financial Secretary, T. J. Ryan: Recording Secretary, J. A. Habig.

THE Foxboro Gas Company, which was recently granted a franchise to establish a gas plant in Foxboro, Mass., has filed its acceptance with the board of selectmen. The directors of the company are Edward F. Craper of Boston, and Clarence A. Barnes and Jas. T. McCool of Mansfield, and Foxboro citizens are to be latter added to the board. The work of construction must be commenced next spring, and the company must be ready to distribute gas by Dec. 1, 1916. It will require about 8 miles of distribution mains for the initial installation. The same interests have secured a franchise in the town of Wrentham.

THE Meridan (Conn.) Gas Light office was a very popular place on Friday and Saturday afternoons and Saturday evening of last week, when waffles were served free to all visitors. The afternoon hours were from 3 until 5 o'clock, while on Saturday evening they were served from 7:30 until 9 o'clock. The waffies were cooked on a gas range in the window and served in the showroom.

IF you make gas you don't have to do anything like this:

"Laredo, Texas, Nov. 18, 1915

To..... .....
Loredo, Texas

Dear Sir:—We wish to advise you that, owing to the shortage of the gas supply in the city of Laredo at the present time, beginning Monday, November 22, 1915, and until further notice is given, we will discontinue furnishing gas to the following consumers: Gas engines, hotels, schools, bakeries, municipal users, furnaces and restaurants. This to protect our domestic consumers as per contract. You will kindly arrange for other fuel.

Yours truly, Border Gas Company."

A RECREATION field, including baseball grounds and tennis courts, gymnasium and club building, are to be established by the Pacific Gas and Electric Company on the company's property at the Exposition, for the benefit of its employees.

P. OLIVER & SON have been awarded the contract for the construction of the gas works building in Lake Charles, La. Work will commence at once, and it is hoped to have it completed in 30 to 40 days. The work of laying mains has already commenced. Workmen in the employ of the American Gas Construction Company are now engaged in tunneling under the paved streets. No paving will be torn up in laying the mains.

THE General Gas Construction Company, of South Haven, Mich., has been incorporated with a capital of $10,000, by Dr. A. C. Runyan, of South Haven, R. C. Beebe, of Otsego, and N. C. Tall, of Kalamazoo. It will do construction work for the gas companies with which the incorporators are associated.

UTILITIES COMMISSION NEWS.

CALIFORNIA RULES MODIFIED.—The Railroad Commission of California has issued an order modifying its order of Aug. 12, which gave eighteen rules to be followed by water, gas, electric and telephone utilities in the matter of service charges, service conditions and extensions. An important item of the original rules was the direction to utilities to return guarantee deposits of consumers. The new order provides that utilities may apply such deposits against current bills until the deposits are absorbed. The principal additional changes are: Where average monthly bills exceeded $2, consumers may be asked to deposit twice such average accounts. The companies urged that $2.50, the maximum residence deposit, was to small in certain cases. The rule forbidding a utility to discontinue service for non-payment of bills for metered service already delivered is changed, so that in cases where the bill is disputed the consumer shall deposit with the commission the amount claimed by the utility, and the commission will investigate the facts and make finding. If the consumer fails to make such a deposit within fifteen days after demand by the utility the latter may discontinue service. The original rule was intended to cover the case in which a customer contests the amount of the bill and the utility, by threat of shutting off service, compels him to pay a bill he believes unjust. To hold that a utility can thus be the judge in its own case, and by reason of the need of the customer for its service compel him to pay an excessive bill, is manifestly unfair, the commission holds. "We believe," the commission says, "that the rule as now framed goes further than is necessary in that it prevents utilities from shutting off their service even in cases in which there is no dispute concerning the amount of the bill and in which the consumer simply refuses to pay an admittedly correct bill." In allowing the utilities to absorb the existing deposits against current bills, the commission says: "Some utilities have taken the position that it would be a hardship for them to be compelled to return at once in cash the deposits they are directed to repay. To take care of these cases, we are willing to modify this paragraph." The revised order as to deposits reads as follows: "(a) Within thirty days after the effective date of this supplemental order each water, gas, electric and telephone utility shall return to the depositor all deposits heretofore made to guarantee payment for a flat-rate service, and deposits made to guarantee payment for metered or measured service by customers who have paid all their bills promptly during the twelve months prior to the effective date of this supplemental order; and (b) within thirty days after demand each water, gas, electric and telephone utility shall return all deposits made to guarantee payment for metered or measured service to customers who have paid all their bills promptly during the period of service in cases in which the service has lasted less than twelve months, provided that such customers shall show ownership of the premises or shall offer guarantors satisfactory to the utility; except that if the utility so desires it may apply the existing deposit against current bills until the deposit is absorbed."

AUTHORITY OF PENNSYLVANIA COMMISSION QUESTIONED.—Authority of the Pennsylvania State Public Service Commission to pass upon contracts between municipalities and corporations or individuals furnishing public service of any kind, has been attacked in the Dauphin County Court at Harrisburg, in injunction proceedings brought against the Commission by Abraham Fischer of Williamsport. Mr. Fischer petitioned the court for a decree, declaring the clause of the Public Service Act of 1913, governing approval of municipal contracts, unconstitutional and void. The case involved a contract between the city of Williamsport and the Lycoming Edison Company, for street lighting. Some time ago the Commission set aside a contract between the city and the Citizens' Electric Company and ordered readvertisement for bids. The Lycoming Edison Company underbid its rival, and the contract was uwarded to it. Fischer asks to have the Commission enjoined from acting on the contract.

Financial Notes.

BALTIMORE financial interests are awaiting the possible meeting between the Columbia Gas and Electric Company interests represented by A. B. Leach & Co., and J. E. Aldred, president of the CONSOLIDATED GAS, ELECTRIC LIGHT AND POWER COMPANY, to discuss the proposition to bring natural gas to the city and distribute it through the mains of the local company. It is said that Mr. Aldred will have but one answer to make to those who control the natural gas supply which it is proposed to bring to Baltimore. He will want to know what they have to deliver, the probable life of the supply and at what price he can buy it for the use of the customers of the Baltimore Company. It is said that this is the position Mr. Aldred has taken from the beginning, and the questions have never been answered to his satisfaction by the Columbia Gas Company people. If they are ready now to name the price at which they would sell the natural gas after it is brought to the outskirts of the city, the Consolidated Gas Company interests will take it under consideration.

THE PACIFIC GAS AND ELECTRIC COMPANY reports earnings:

October.	1915.	Increase.
Gross	$1,567,353	$157,659
Total income	696,966	83,669
Surplus	343,428	137,244
Ten months.		
Gross	15,291,114	1,371,119
Total income	6,855,083	894,208
Surplus	2,376,714	892,935

THE Railway Commissioners of Nebraska have made an order allowing the BROKEN BOW GAS COMPANY to capatalize for $20,000. Some time ago the commission was asked to allow a capitalization of $30,000, and the matter was referred to Commissioner Hall. He states that he made an exhaustive investigation, making two trips to Omaha and going over the books of the company thoroughly. He claims that he found that the company had expended or invested approximately $10,000, so he recommended that capitalization to the amount of $13,000 be allowed, the extra $3,000 being for working capital and expenses.

COMBINED net earnings available for dividends of subsidiary companies of Massachusetts Gas Companies for October were $212-350, a decrease of $30,249, or 12.53% compared with corresponding month a year ago.

BLACKSTONE VALLEY GAS & ELECTRIC CO., semi-annual of $3 preferred and quarterly of $2 on common, are payable Dec. 1.

THE LACLEDE GAS LIGHT COMPANY has declared the regular quarterly dividend of 1¾% on common stock and the regular semi-annual dividend of 2½% on the preferred stock, payable December 15.

THE LOUISVILLE GAS & ELECTRIC COMPANY directors have authorized a disbursement of $162,045 on the preferred stock, 1½% payable December 20. A dividend of 3% on the stock which is a 6% stock has already been paid making the total for the year thus far 4½%. With 2% still due from last year, the amount still owing to holders of preferred stock is equal to 3½%. The amount of the stock is $10,803,000.

BOSTON CONSOLIDATED GAS has been active on rumor of the declaration of a large extra dividend to reimburse shareholders for reductions during past years, when the earnings and the conditions did not warrant the payment of the regular amount. A similar rumor has been circulated at frequent intervals during recent years. In 1901 the dividend rate was increased from 6 to 8%; in 1904 and 1905, 8½% was paid; in 1906 the rate was reduced to 5%, and in the following year to 4%, where it remained until 1910, when 4½% was paid, the rate being advanced to 6% in 1911, and maintained there until last June, when 1¾ was paid for the quarter, the subsequent declarations being at this rate.

THE GULF GAS COMPANY, of Biloxi, Miss., has been placed in the hands of a receiver, A. L. Staples, Secretary of the Company, being appointed. The complaint was in the name of the National City Bank of Mobile, Ala., trustee for the bondholders.

SALES of NORTHERN STATES POWER COMPANY 7% preferred stock in the territory of its operating units has reached approximately $200,000 par value, taken by some 350 investors in Minneapolis, St. Paul, Fargo, Sioux Falls and other cities served. While the partial-payment plan is growing in favor, the majority of sales have been for cash. The business of the company is maintaining its ratio of growth and the market price of the stock has advanced.

Gross earnings and net earnings of all the properties now controlled by the company are reported as follows for month of October:

	1915.	1914.
Gross earnings	$461,427.46	$389,109.19
Net earnings	271,560.45	222,514.12
10 months to October 31:		
Gross Earnings	$4,073,599.62	$3,603,190.66
Net earnings	2,257,398.34	1,924,530.60
Operating results for 12 months ended October 31, 1915:		
Gross earnings		$4.975,655.93
Operating expenses, maintenance charges and taxes.		2,212,410.87
Net earnings		$2,763,245.06
Fixed charges		1,501,217.35
Balance		$1,262,027.71
Preferred stock dividends		587,069.00
Surplus available for depreciation, common stock dividends, etc		$674,958,71

CONTENTS.

AN ASTERISK (*) DENOTES AN ILLUSTRATED ARTICLE.

*THE COMPOSITION OF GAS IN RELATION TO THE PERFORMANCE OF THE BUNSEN BURNER, by R. S. McBride..... 353
BABBITT METAL, by S. U. Tuspin..... 355
PRESENT PRACTICE IN THE SALE OF GAS IN THE UNITED KINGDOM, by F. W. Goodenough..... 356
N THE N. C. G. A. NEW YORK SPECIAL..... 359
EDITORIALS..... 360
Report of the Washington Convention.
THE SHOW WINDOW—DOES IT PAY? by S. H. Alexander.. 362
*THE SHOW AT WASHINGTON..... 363
Recent Patent Issues..... 364
NEW METHODS AND APPLIANCES..... 365
*Water Heating by Gas Engine Exhaust.
Publications..... 365
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 366
Explosives in Drip Oil—Lowell, Mass., Street Lights—Business Good—Compare Lighting by Photographs—Mr. Byllesby Tours—Stacey Brothers Plant—Mr. Mason to Dansville, N. Y.—George M. Clark & Co., Moves—Public Utility Association of West Virginia—Need Fire Clay—Tuscaloosa Mains — Standard Utility Corporation — Colonel Roper to the Salesman—Canadian Troops—Cathedral Lighting—Military Night at Revere, Mass.—Gainesville Ice Company—Baltimore to Get 75 Cent Gas—Halifax Works—Newark Social Club—Foxboro, Mass., Company Accepts—Makes Waffles in Window—Get Other Fuel—Recreation Field in San Francisco—Lake Charles, La., Building—A Small Construction Company.
UTILITIES COMMISSION NEWS..... 367
California Rules Modified—Authority of Pennsylvania Commission Questioned.
Financial Notes..... 368
Public Lighting Table for Dec., 1915 (Ad. Section)..... 7
Meeting Times of the Various Gas Associations (Advertising Section)..... 21